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Students and teachers meet the chapter on 'Human Reproduction' in the high school biology textbook with hesitation. How do we break this stigma? Is it possible to connect this chapter with realistic conversations? How do we do this in a manner that is open and helpful for students?

As high-school students make the transition into puberty, their interest in the body and sex is piqued. They become curious and eager to learn about their bodies, as well as the physical and emotional changes they experience during this transition. Most school curricula recognise the importance of equipping students with accurate information and empowering them with the ability to reflect, think critically, and fearlessly communicate thoughts or questions regarding their sexuality and sexual well-being. However, the basic information that most textbooks provide is neither up-to-date nor comprehensive in nature. They do not, for example, cover the biology of ejaculation, erection, premenstrual syndrome, etc. The internet is another easily accessible source of information

for many students. Unfortunately, much of the information they access there may be fragmented, biased towards the male sexual experience, and may set unrealistic standards for beauty and intercourse. This may negatively impact their sexual growth and well-being. Lastly, teachers may find it difficult to find avenues for open conversations on this theme for a variety of reasons, including personal discomfort, ideological conflicts, and academic constraints.

The unit on 'Human Reproduction' in the high school science curriculum may offer an avenue not only to discuss the biology of this process but also to encourage reflection on the needs and values associated with sex and reproduction. This article describes a module that I designed to promote awareness of the human body, anatomical and behavioural

changes during puberty, and the science of intercourse. In addition, it aimed to encourage students to articulate their understanding of body and sex comfortably—to normalize conversations and break the associated cycle of judgment, shame, and stereotypes. As a teacher-student group, we have questioned societal norms, our ideas of beauty and relationships, and the influence of media. We have also been open about our ignorance.

I tried this module with four consecutive academic batches of Grade IX students of a private residential English medium school. Each batch had 50 students of mixed genders, divided into two sections. About 12 hours were dedicated to the completion of the module for each batch. This article summarizes the common approaches and observations from students across all four batches.

The icebreaker

A simple approach I use to break the ice is to chalk out the words 'Human Reproduction' in bold on the blackboard and distribute blank sheets of paper to the students. I then say, "Share any questions you have on the topic of

human reproduction. The questions can be anonymous. I will read each of your questions. If I know the answer, I will share it with you. If I don't know the answer, we will try to find it together."

After about 5-10 minutes, I further encourage them: "You know this can be a wonderful opportunity to ask any kind of question, be it about growing up, sex, pornography, gender, pregnancy, masturbation, etc. You could get useful information instead of browsing aimlessly on the Internet and being led to possibly confusing answers or dead ends. Please do use this opportunity to ask any question you want."

Usually, the students are hesitant at first; they make faces, laugh, and inevitably tell me that they don't have any questions. However, over the years, I have observed that when given sufficient time (I allot the entire class duration of 60 minutes to this exercise), several questions emerge from the students (see Fig. 1). In fact, I once received as many as 260 questions from a single batch! There have also been instances where students have submitted additional questions in person after the class (see Box 1).

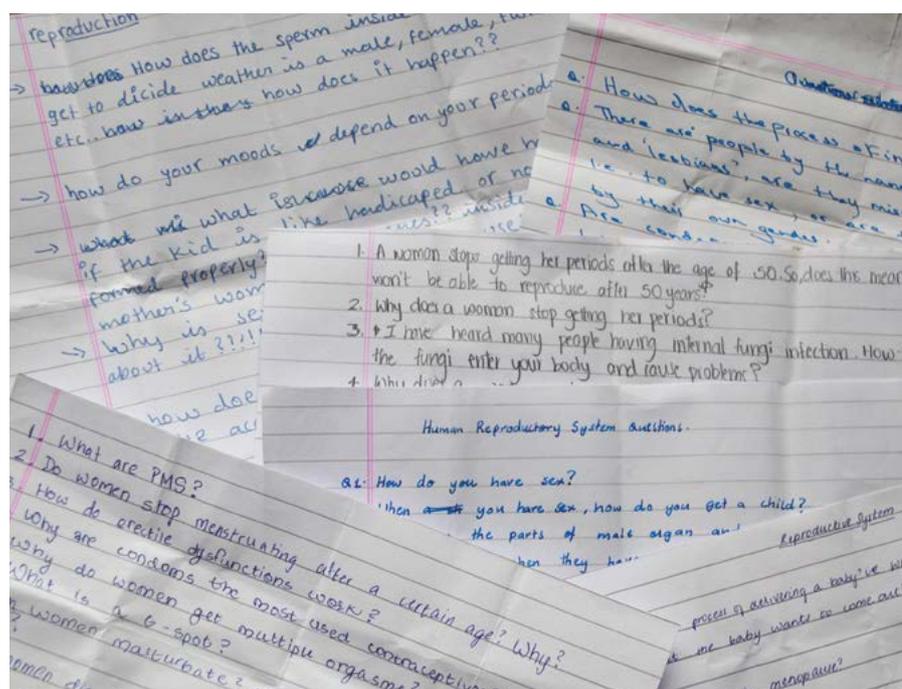


Fig. 1. A collage of responses from students to the icebreaker question.

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Box 1. Sample questions from students:

This is a sample from a collation of students' questions from 2016-2020. Some of these questions, along with responses to them, are available on the Sawaliram website (<https://sawaliram.org/search>).

- Why is menstruation painful?
- Why are periods considered taboo? Why do shops wrap sanitary napkin packets in sheets of newspaper or pack them in black polythene?
- How did women manage menstruation before cloth pads or sanitary napkins?
- Are there reasons other than pregnancy for a woman to miss her periods?
- Why does the menstrual cycle start for some at 10 years of age, and at a later age for others?
- Why do women start having periods from when they are 10-12 years of age when they usually only give birth after they reach their 20s?
- Why are female body parts called derogatory terms?
- Are girls attracted to bigger penises?
- Why do boys, and not girls, grow taller during puberty?
- Do men also have menopause and lose the ability to reproduce?
- Why does Indian TV blur only female undergarments (like bras) and not male undergarments?
- Does it hurt when you have sex for the first time?
- Why do people get addicted to sex?
- How do you dispose of condoms?
- If a man and a woman have unprotected sex, is it necessary that it will result in fertilization?
- Are morning-after pills harmful?
- What happens during labour?
- What is a C-section?
- Why do people masturbate and why is it considered taboo?
- When people masturbate, what pleasure does it give them?
- Why do people watch pornography? What makes them want to watch it?
- Why do humans show sexual attractions or desires?
- How are emotions and mood swings controlled by the body?
- How do other organisms change their gender?

I start by separating questions, like those related to the exact mechanics or details of the act of sex itself, that I do not intend to address in class, either due to my own discomfort or their age-inappropriateness. To more effectively address the remaining questions, I arrange them into categories, like body/anatomy, pregnancy, intercourse, pornography, etc. I take a week or two to find accurate answers to these questions from books, the internet, peers (other teachers), or clinicians. I also use this time to mentally prepare for the next class. For example, I actively work towards using a non-judgemental tone and body language while answering questions. I also review the boundaries that I will set with the students.

Exploring the questions with students

(a) Chalk the talk

Typically, I start with questions related to

the human anatomy. Rather than show a chart or a PowerPoint presentation, I draw the male and female reproductive systems on the blackboard and encourage the students to replicate these diagrams in their own notebooks. As they work on their drawings, I walk around the classroom to observe their behaviours and attitudes. Surprisingly, the initial sense of discomfort that students display when I begin drawing the diagrams on the board is quickly replaced with a sense of ease when they start drawing. It is possible that drawing diagrams by hand helps break some of the stigma associated with reproductive organs.

After the students finish their drawings, I name each part of the reproductive system, share the etymology of their names, and explain what they do. I use the same tone and manner that I use when I teach about the human heart or the anatomy of a leaf. This practice helps students to perceive the process of learning about reproductive organs

as being similar to learning about any other organ. Several questions about the anatomy and physiology of the reproductive system get addressed through this method. At the end of the class, I also read out the student questions that were covered (see Box 2).

(b) Out in the open

After the chalkboard discussion, the next set of classes are typically conducted outside the classroom in open areas of the school, as open spaces are less constrictive and facilitate unhindered interactions among students. The students and I sit in a circle during these open space sessions, so that we can all see each other and feel our human connection. I give a short introductory talk to share the theme of the discussion, its purpose, and expectations from them during the discussion. I also encourage them to see the discussion as a collective learning experience, invite them to feel free to express themselves, and stress the

Box 2. Sample questions addressed in the blackboard sessions and the approaches followed:

Q. What are gonads?

I treated this as a question on the anatomy and physiology of the reproductive system and used blackboard drawings to answer it. I also clarified a common misconception that only the male body has gonads. On occasion, we would also listen to parts of this podcast: <https://www.wnycstudios.org/series/radiolab-presents-gonads>.

Q. Where is the sperm produced and how? Where does the sperm go during intercourse? How does the sperm cell know where to go?

In addition to the blackboard, I used some video resources to address these questions. These included:

- A video on the physics of movement of the human sperm: https://www.ted.com/talks/aatish_bhatia_the_physics_of_human_sperm_vs_the_physics_of_the_sperm_whale.
- A microscopic visualization of the human sperm: <https://youtu.be/JQ5RvbJWftQ>.

Q. How does an erection occur?

Here, I explained the structure and functioning of the nervous system, muscles, and blood vessels. As these themes overlap with other chapters in the biology curriculum, I could make connections with what students had learned prior to this class and grade.

Q. How much time does it take for a female to get pregnant after sex? What is the probability of becoming pregnant when you have sex?

These types of questions were addressed to introduce the menstrual cycle. A video resource that can be used here is: <https://youtu.be/ayzN5f3qN8g>.

Q. What are condoms? How do they break?

I discuss this question after sharing this video on contraceptives: <https://www.youtube.com/watch?v=Zx8zbTMTncs>.

We also discuss female contraceptives at length. I share this video on why female condoms are so hard to find: <https://youtu.be/6XxA-4Jp7AU>.

Then, I share this educational video on how to use a condom: <https://www.youtube.com/watch?v=06kT9yfj7QE>. I also introduce the topic of sexual consent here through this video: <https://www.youtube.com/watch?v=pZWvrxVavnQ>.

Q. What do boys experience during puberty?

I discuss the many changes that occur during puberty. This can help normalise these changes and conversations around them. For example, speaking openly about nocturnal emissions or menstruation helps students not feel ashamed and accept these natural changes as normal processes. Here is a video resource that could be helpful: https://www.youtube.com/watch?v=-XQcnO4iX_U.

Here are a few other frequently asked questions that I discuss during these sessions:

- Q. Why do we experience pain during periods?
- Q. What is PMS?
- Q. How does one know that a female has conceived?
- Q. Why do women experience menopause? Why do they never get pregnant during menopause?
- Q. Why is the male sexual organ sensitive?
- Q. What is virginity, and how do you lose it?

Box 3. Sample questions addressed in the open discussions and the approaches followed:

Q. How come we all have similar ideas about what is beautiful?

We watch this video on the 'Science of attraction': <https://www.youtube.com/watch?v=169N81xAffQ>. We also discuss existing social norms of beauty, body shaming, etc. Discussion can also be initiated with questions, such as: What is meant by being beautiful? Does beauty mean—being thin, fair, muscular? Do we have to fit a certain definition to be beautiful? Who defines the criteria for beauty? Does media play a role in this definition? Do we unconsciously allow ourselves to be defined by what we see in media? What can we do to establish a positive relationship with our own bodies?

Q. How do you know when you are pregnant? What are the symptoms?

To prime our discussion, we watch videos on:

- Surprising effects of pregnancy: https://www.youtube.com/watch?v=F_ssj7-8rYg.
- Crash course video on pregnancy: <https://www.youtube.com/watch?v=BtsSbZ85yiQ>.
- How do pregnancy tests work: <https://ed.ted.com/lessons/how-do-pregnancy-tests-work-tien-nguyen>.

Q. What is a test-tube baby?

We watch this video on in-vitro fertilization (IVF): <https://ed.ted.com/lessons/how-to-make-a-baby-in-a-lab-nassim-assefi-and-brian-a-levine>.

Q. Are there reasons other than pregnancy for a woman to miss her periods?

We watch a SciShow video on 'Why did you skip a period': <https://youtu.be/DT37UwFPF8c>. We also discuss the role of nutrition, exercise, and hormones on periods.

Q. What is homosexuality? Is it normal to be homosexual?

Here I explain what LGBTIQ is, and share that it is perfectly normal to be any one of them. We also discuss societal prejudices around gender and related laws.

Here are some other frequently asked questions that I discuss during these sessions:

- What are HIV and AIDS?
- How does sex give pleasure?
- What is an orgasm?
- Is it right to want to have sex at the age of 14?
- Is sex painful?
- How are twins formed?
- What is pornography? Is it harmful?
- Which is a healthier option for a mother—operation or normal delivery?
- Is there a female equivalent for masturbation? What is it?
- Why are teenagers interested in sex?

need to refrain from making fun of or judging anyone.

I start the discussion by reading aloud any one of the collated questions (see Box 3). Usually, I choose an extension of the anatomy-based questions. This could be a question like, 'How many times is intercourse needed to fertilize an egg?', or 'Why is periods considered a taboo topic to discuss openly?' or 'Does it hurt when one has sex?'. Students tend to avoid eye contact or stare at the floor while I read this. After I have finished, I take a long pause to look at everyone in the circle. Then I encourage the students to take over, by asking questions like, "What do you think of the question? Does anyone know what the question means?" Slowly, the students start to open up. In the end, for each of the student questions that I read aloud, either I offer the necessary information, or we draw conclusions or summarize our thoughts together as a group. This introductory discussion session typically

helps me to gain a better understanding of students' thoughts; as well as gauge peer influences, and their comfort levels. It helps students become more confident in articulating their thoughts in front of their peers. I then move on to other questions, using the same broad approach to facilitate discussion. In order to respond to the questions as holistically as possible, we may touch upon many associated themes, like the human brain, addiction, narcotic drugs, pornography, existing societal taboos, consent, sexual rights, and pleasure. Also, where appropriate, I may play short videos that help students gain a better visual understanding of the points raised during the discussion.

Students consistently show a positive response to these discussions, and many a time I have found it difficult to end the class because the students wanted to continue their discussion to the next period as well. Every class has some students who are chirpy and ask questions aloud, and some shy ones

who signal me to approach them to voice their questions. There are also a few who very obviously struggle with their feelings. As we proceed with the questions, the students begin to communicate more and more openly. I have noticed that peers play an important role in easing inhibitions and setting the overall classroom dynamics. For example, seeing a classmate ask questions encourages others to ask as well. Similarly, a light-hearted comment from a classmate eases the tension in the classroom. As a teacher, I facilitate such a supportive environment by being neutral and non-judgemental to all questions from students. This helps establish a circle of trust that allows students to fearlessly ask follow-up questions that are both general and personal in nature. On occasion, students may also share personal experiences of the impact that community/social norms, body images, or stereotypes have on their well-being. Some students continue with these discussions at home and get back to class with more questions. Very often,

this practice of asking questions and participating in discussions continues beyond this grade. For example, students from some of these batches wanted to discuss the same topics again in Grade XII. Some students even had the same questions that they had asked in Grade IX. It may therefore be helpful to repeat this module at different academic levels.

(c) Faculty invites: Another interesting approach that I followed was to invite other members of my school community to address specific questions. For example, a mathematics teacher, who was a new mother, discussed different modes of birthing and her experience with water birthing in particular. The school doctor shared his expertise on reproductive health, and a teacher with a degree in psychology discussed some sociological and psychological aspects of reproduction. Each of these was

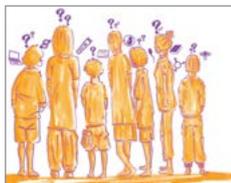
an enriching experience and offered students the opportunity to connect with their teachers in a novel context.

Parting thoughts

Over the years, I have observed that students look forward to this module, both because they are eager to gain more information and because they appreciate the opportunity for discussion. Discussions throughout the module have been consistently intense (except those in the first one or two classes, in which getting student participation is inevitably a struggle). Although some parts of the module are information-heavy, students have enjoyed the overall learning experience. Since the module covers all parts of the related unit in the curriculum, it negates the need for extra classes to cover the unit from an exam-centric view.

While the approaches described in this article may seem daunting to a teacher at first, it can be a truly rewarding experience in the end. The resources shared in this article could help prepare teachers to gain necessary and accurate information. However, it is also important to be mentally prepared to be sensitive to heteronormative, judgmental, and patronizing attitudes; to be inclusive; and to consistently ensure that the discussions are not fear-driven. It is beyond doubt that this is not an easy task, especially with the additional constraints of time and syllabus coverage. But at the end of the day, we need to pause and ask ourselves: Why do we teach? What are our values as a teacher? What are our expectations from students? Is it not our responsibility to enable students to think rationally, reflect, and express themselves freely?

Key takeaways



- Creating an environment that is supportive of students' curiosity provides learning opportunities for both students and teachers.
- Frank and open discussions that allow students to pause and reflect, specifically on sensitive topics, help them overcome their inhibitions.
- It is important for a teacher to be non-judgemental and inclusive in order to provide a secure learning environment for students.

Acknowledgments: I thank my students for asking such wonderful questions, and my colleagues for their enthusiasm and consistent support. I also thank the editors and reviewers for their detailed feedback and suggestions.

Note: Source of the image used in the background of the article title: Discussing reproduction. Credits: Shreya Kedia. License: CC-BY-NC.

Some useful resources:

1. TARSHI. The Yellow Book: A parent's guide to sexuality education. Zubaan Publishers (2010).
2. TARSHI. The Blue Book: What you want to know about yourself. Zubaan Publishers (2013).
3. TARSHI. The Orange Book: A teachers' workbook on sexuality education. TARSHI publications (2015).
4. Campbell, N. A., Urry, L. A., Cain, M. L., Wasserman, S. A., Minorsky, P. V., & Reece, J. B. Biology: A global approach. Pearson (2018).
5. Taylor, D. J., Green, N. P. O., & Stout, G. W. Biological science. Cambridge University Press (1998).
6. EONS Collection. How sex became a thing|Eons. PBS LearningMedia (April 7, 2021). Retrieved on July 6, 2022, from <https://www.pbslearningmedia.org/resource/sex-thing-eons/sex-thing-eons/>.
7. Schilthuisen, M. The evolution of animal genitalia. YouTube (April 24, 2017). Retrieved on July 6, 2022, from <https://www.youtube.com/watch?v=vcPjkz-D5II>.



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