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RESEARCH ARTICLE

Using "*thinking hat*" debates to address controversial topics and enhance critical thinking in the pharmacy programme

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Abstract

Background: This study shares advantages and lessons learned on the design and incorporation of the "*thinking hat*" in debates in the pharmacy curriculum, which was used to address controversial topics, including Diversity, Equity, Inclusion and Anti-racism (DEIA). **Methods:** The "*thinking hat*" was administered in three independent Doctor of Pharmacy degree (PharmD) programmes to five student cohorts. The debate topics were: "*COVID-19 vaccination mandates*" and "*genetic sequencing in healthcare*." The structure and assessment were similar. At the completion, students completed a perception survey and reflected on their experience. **Results:** The "*thinking hat*" can be implemented in pharmacy schools to increase critical thinking, and integrate awareness of topics, like DEIA. The "*thinking hat*" is easily reproducible and versatile for each institution's needs, making it a useful tool to share. Common themes from student feedback included enhanced class engagement, applicability of concepts discussed in the classroom, better preparation for facing challenging opinions in practice, and awareness of diversity and inclusion. **Conclusions:** The "*thinking-hat*" activity was conducted in multiple locations, with different delivery methods, and with larger cohorts than previous debates in the literature. The "*thinking hat*" approach applies across various settings and can be used to introduce timely and controversial topics.

Introduction

Debates are an effective teaching method in healthcare education to promote critical and diverse thinking, improve communication skills, enhance teamwork, and provide a more in-depth understanding of content (Gálvez-Peralta *et al*., 2018; Viswesh *et al*., 2018; Ang *et al*., 2019; Hawkins *et al*., 2019). Given the value of debates in healthcare education, it is important to investigate and establish best practices and settings for this educational tool. Numerous studies show the benefits of debates in pharmacy education, yet many do not demonstrate the versatility of debates in education (Gálvez-Peralta *et al*., 2018; Viswesh *et al*., 2018; Ang *et al*., 2019; Hawkins *et al*., 2019). For example, debates with varying cohort sizes, locations, and/or those using an online format are underreported.

In this work, the investigators share the lessons learned when designing and implementing a modified educational approach from the debate, called the "*thinking hat*", that can be used in the classroom setting, synchronously online, or asynchronously. This technique was initially designed by DeBono (DeBono, 1985) to help decision-making and marketing in business, increase creative thinking, and address the same problem from different viewpoints. In DeBono's model, the person addresses a challenge wearing a "*hat*" that could focus on the following positions: facts-oriented, intuitive, cautious, optimistic, creative, and controlled. In this work, the investigators created new "*hats*": patients, patients of underserved populations,

healthcare providers (including pharmacists), policymakers, and pharmaceutical companies, among others, intending to mimic the real-life situations that a student or pharmacist might face after graduation. Previous literature has justified the "*thinking hat*" as useful in any discipline, including health sciences (Goebel & Seabert, 2006; Gálvez-Peralta *et al.*, 2018; Nutter & Gálvez-Peralta, 2018). In this work, the authors share the tools of the "*thinking hat*" technique adapted to pharmacy programmes using different topics in three institutions and demonstrate its utility to enhance critical thinking by addressing controversial topics.

Methods

Design

This was a prospective study using the "*thinking hat*" debates across three institutions in varied settings. The two topics that were debated were vaccination mandates and the use of genetic sequencing in patient care. The vaccination "*thinking hat*" activity was offered after students learned about different types of vaccines and at the time when COVID-19 vaccines were under FDA emergency approval. For most students, the genetic sequencing "*thinking hat*" activity was offered as part of a class after students learned the ethical, legal, and social implications (ELSI) of genomics. For Institution A, the debate on vaccines was offered to students in the second year as part of one of the graded assignments of a required course (Immunology and Autoimmune Diseases) and the debate on genomic testing to first-year students as part of a required Pharmacogenomics course. These activities were offered synchronously via Zoom during the year of the pandemic and then moved back to in-person when students were allowed to be in the classroom. Students were separated into three sessions of two hours to accommodate participation in large class sizes for each group. In each session, students were assigned to different hats, including three to six students in each. The comparison of the three institutions that used the "*thinking hat*" approach for debates on controversial and timely topics in the pharmacy educational curriculum is shown in Table I.

Table I: Institutional comparison of using the "*Thinking Hat*" debate

	Institution A	**Institution B**	**Institution C**
Private vs. Public	Public	Private	Private
Pharm.D. curriculum	2+4	2+4	2+4
Courses in which the debates were implemented	Required	Elective	Elective
Average course students' size	65-80	33 - 55	20
Student progression	1st or 2nd year	2nd or 3rd year	2nd or 3rd year
Debate setting	• Synchronous in-person and/or online • Asynchronous*	• Synchronous in-person and/or online • Asynchronous	• Synchronous in-person
Topics	• COVID-19 vaccination mandates • Implementation of pharmacogenetic testing in patient care	• COVID-19 vaccination mandates • Implementation of pharmacogenetic testing in patient care	- • Implementation of pharmacogenetic testing in patient care
Number of "*hats*"	4-5	5-6	5
"*Hats*" (Each hat had its "*for*" and "*against*" team)	• Healthcare provider • Patient/parent from a minority group • Health insurances • Policymakers • Pharmaceutical companies	• Healthcare provider • Health insurances • Policymakers • Private companies • Employers	• Provider • Pharmacist • Patient • Minority/ Underrepresented individual • Insurer
Number of students assigned for each position ("*for*" or "*against*")	3-6	5-6	2
Adaptation for a large class setting	Subgroups of 26 did the activity at different class times/different facilitators	Division between students discussing synchronously (30) and asynchronously (25)	N/A
Length of the debate	110 min	50 min	80 min

*(Nutter & Gálvez-Peralta, 2018)

Before this work, Institution A also used asynchronous, and students posted comments on a blog. For Institution B the debate of vaccines and pharmacogenetic testing was offered to two different cohorts of students that were enrolled in an elective in different years. Students participated via Zoom synchronously. Students who were unable to participate synchronously due to excused absences or time constraints in the course participated asynchronously via a discussion board in the Learning Management System. For Institution C, only the in-person genetic sequencing debate was offered involving second and third-year students in an elective course (Pharmacogenomics and Precision Medicine). Briefly, students from each institution were provided instructions, reference resources, and assigned "*hats*", one to two weeks before the debates. Students then participated in the activity and completed a reflection and/or an anonymous perception survey (Figure 1). One difference between institutions was the counter-argument approach, at Institution A students from any "*hat*" could counter-argument with any other "*hat*", while at Institutions B and C only assigned "*hats*" could counter-argue (Figure 1).

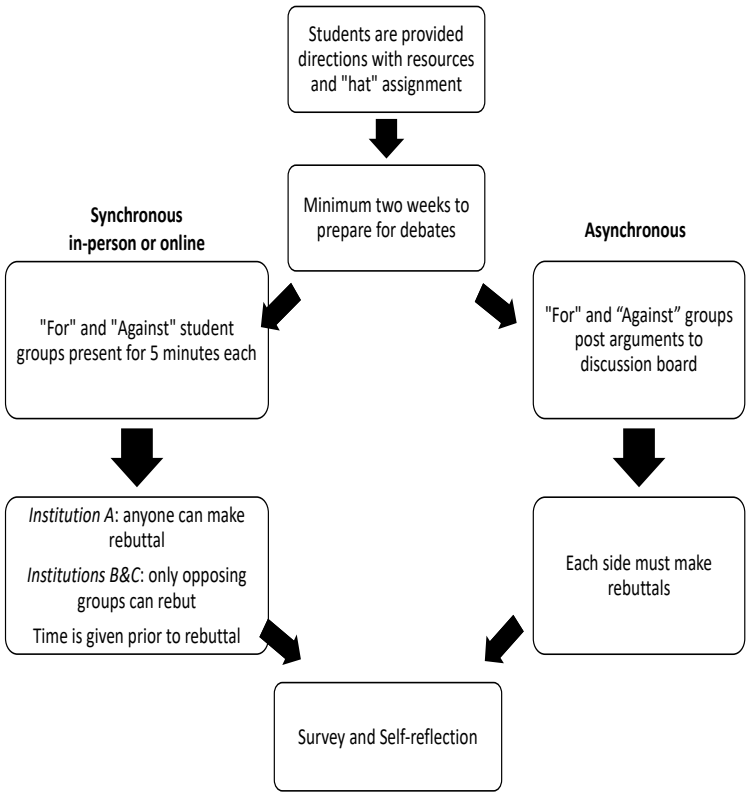

Figure 1: Flow of "*thinking hat*" debates. Students are provided directions and resources with their assigned "*hat*" and given at least two weeks to prepare their arguments and counterpoints. Groups that present synchronously are given the time limits, and rebuttals by the opposing viewpoint are allowed. Depending on the institution, anyone can make a rebuttal or only those that were assigned to the same "*hat*". Groups that present asynchronously utilise a discussion board to create their arguments and rebuttals. All groups finished with a survey. Reflections were completed for some courses.

Characteristics of each institution and debate setup are summarised in Table I. Instructions for the activity adapted by each institution are available in Appendix A–E.

Feedback about the students' preferences and opinions of the "*thinking-hat*" approach was gathered via an anonymous perception survey offered to all students at the three institutions at the end of the activity. Survey participation was mandatory or incentivised with class points. The survey contained fourteen Likert-scale questions and two open-ended questions. Survey questions were already validated by previous use or tested before use (Gálvez-Peralta *et al.*, 2018; Nutter & Gálvez-Peralta, 2018).

To analyse and compare findings from the Likert-scale questions, "*Strongly agree*" and "*Agree*" responses or

"*Very helpful*" and "*helpful*" responses were added. To analyse the responses to open-ended questions from the three institutions, two investigators independently coded the responses, identified themes, and compared results. If the themes were unclear, the whole team discussed the category for that response. If responses had more than one theme, they were counted for each category. This study was approved by each institution's Institutional Research Board (IRB), and an Institutional data transfer and use agreement was signed. Analysis was performed using Microsoft Excel (Version 16.63).

Results

The investigators collected their observations of lessons learned from each "*thinking hat*" debate experience to help other faculty in the academy implement debates in their programmes. Table II summarises the lessons learned, demonstrates the versatility of how debates can be adapted, and compares the "*thinking hat*" approach with current literature in the field. Table II shows the major components of creating a successful "*thinking hat*" debate, evidence is summarised based on experience and cited where possible.

Table II: Lessons learned from the debates

	Synchronous/in-person debates	Adaptation for asynchronous debates	Supported by literature
Directions to students	• Provided one-to-two weeks before the debate	• Add common online discussion board etiquette and expectations for students (e.g. number of posts and how to respond)	Crockett, 2017; Dy-Boarman *et al*., 2018; Salter *et al*., 2014
Resources for students*	• Provided several reputable examples from the literature or news.	• Students were randomly assigned	Hanna *et al*., 2014; Lampkin *et al*., 2015; Steuber *et al*., 2022
Students per "*hat*"	• Minimum two students per "*hat*" per affiliation	• Individual or per group	Darby, 2007; Lieberman *et al.*, 2000
Assignment	• Students were randomly assigned "*hat*"	• Students were randomly assigned	Ang *et al*., 2019
Facilitator involvement	• Intervene to maintain decorum and clarify student misconceptions. • Monitor time	• Monitor discussion boards to maintain decorum and clarify student misconceptions. • Generate interest and engagement by posting encouragement or questions	Gálvez-Peralta *et al*., 2018
Timing*	• Each affiliated side per "*hat*" is given four to five minutes for opening arguments, side is given five minutes to rebut opening arguments, the total time is 20 minutes per "*hat*". • If multiple "*hats*" are allowed to provide a rebuttal, the length was extended to 90 min. • Time was given for each hat presentation and rebuttal, and a few minutes were given to prepare for rebuttal.	• Have due dates for opening arguments and rebuttals	Ang *et al*., 2019; Darby, 2007; Gálvez-Peralta *et al*., 2018; Green & Klug, 1990; Hanna *et al*., 2014; Hawkins *et al*., 2019; Jugdev *et al*., 2004; Lampkin *et al*., 2015; Lieberman *et al*., 2000; Lin & Crawford, 2007; Mamtani *et al*., 2015; Nutter & Gálvez-Peralta, 2018; Salter *et al*., 2014; Schon, 1983; Randolph, 2007; Steuber *et al*., 2022; Tervalon & Murray-Garcia, 1998; Viswesh *et al*., 2018
Debrief	• Small groups, address discrepancies, microaggressions, or equity/access to care	• If possible, one general announcement to the course	Dy-Boarman *et al*., 2018
Participation	• Encourage every individual to participate.	• Generate as many discussion boards as necessary to ensure each student can participate, during debrief include salient points from varying discussion boards	Ang *et al*., 2019; Jugdev *et al*., 2004; Lin & Crawford, 2007; Randolph, 2007
Assessment	• Participation • Rubric-guided reflection of the impact of the activity, reflection. • Request students provide references outside of those provided	• Participation was assessed by monitoring student's entry before the deadline.	Dy-Boarman *et al*., 2018; Schon, 1983

*(Refer to Appendix A for individual institution instruction for details)

This activity was offered to 156 students from the three institutions (59 and 42 for Institution A; 55 and 33 for Institution B; and 20 for Institution C). Student feedback from survey questions or reflections demonstrated that the "*thinking hat*" debates raised ethical concerns about the logistics for vaccination and/or genetic testing and the implementation and accessibility to vaccination and/or genetic testing (Table III), and 80 to 100% of students shared the improvement of their awareness for different points of view and minorities with this activity (Table III, Q.5). It also reflected an impact on reinforcement of concepts previously learned in class (vaccine development and approval, or ELSI concerns) (Table III, Q.13 and 14), as well as how the "*thinking hat*" helped to apply knowledge learned and apply it to real scenarios (74-95% of students) (Table III Q.3). The "*thinking hat*" activity altered students' opinions about the debate topics. At institution A, 40% of students (42) and 22 % (59) changed their perspectives on vaccination mandates and genetic sequencing, respectively. At Institution B, 16% (33) and 6% (55) of students changed their perspectives on vaccination mandates and genetic sequencing, respectively. At Institution C, 25% (a total of 20 students) shared that their perception was changed from the "*thinking hat*" experience (Table III). Responses were collected, and percentages for each institution or cohort were calculated.

Table III: Percentage of student responses to survey Likert-style questions

	Percentage of students (%) per institution/cohort "*SA + A*"* or "*VH + H*"†				
	Vaccination mandate		**Genetic sequencing**		
	Institution-A N = 42	**Institution-B N = 33**	**Institution-A N = 59**	**Institution-B N = 55**	**Institution-C N = 20**
Q1: The logistics of the debate were amenable to learning and applying information.	78.6	93.5	83.1	92.0	100
Q2: I enjoyed working through the debate with my teammates.	73.8	77.4	83.1	74.0	95.0
Q3: The debate activity helped you to apply knowledge learned and apply it to real-life scenarios.	78.6	83.4	76.3	96.0	95.0
Q4: My knowledge has improved as a result of the debate and reflection.	81.0	80.6	79.7	86.0	95.0
Q5: My awareness regarding different points of view and minorities-black, indigenous, and people of colour (BIPOC) has improved as a result of the debate and reflection.	81.0	80.6	81.4	86.0	100
Q6: I was motivated during the preparation and the debate activity.	73.8	80.6	69.5	86.0	90.0
Q7: Debates should be included more throughout the curriculum to reinforce critical thinking, application of concepts to real-life scenarios and increase awareness of different perspectives.	54.8	61.2	39.0	86.0	63.1
Q8: How well did the debate help you to better understand concepts learned in class?	54.8	80.6	59.3	86.0	85.0
Q9: How well did the debate help you to learn new information about the debate topic?	73.8 ‡		62.7	72.0	80.0
Q10: How well did the debate help you to reinforce concepts learned in class?	59.5	74.1	62.7	84.0	90.0
Q11: How well did the debate help you to learn new information regarding social justice and awareness?	85.7	77.1	71.2	68.0	90.0
Q12a: How well did the debate helped you to learn the role of pharmacists in DNA sequencing, genetic medicine, and pharmacogenomics (Genetic sequencing debate)?			66.1	76.0	80.0
Q12b: How well did the debate help you to learn new information regarding drug approval (Vaccinations debate)?	61.0	71.0			
Q13: How well did the debate help you to reinforce concepts regarding social justice and awareness?	83.3	80.6	71.2	72.0	85.0
Q14a: How well did the debate help you to reinforce the role of pharmacists in DNA sequencing, genetic medicine, and pharmacogenomics (Genetic sequencing debate)?			72.9	76.0	85.0
Q14b: How well did the debate help you to reinforce concepts regarding drug approval (Vaccinations debate)‡	59.5	77.4			
Percentage of students that changed their mind after the session	40.0	16.0	20.0	6.0	25.0

*SA, Strongly Agree; A, Agree, †VH, Very Helpful; H, Helpful; ‡- In this debate FDA drug approval was discussed

The open responses also demonstrated an increased recognition and empathy for the opposing viewpoint and nuisances of policies and mandates for either of the two scenarios. A thematic analysis of all student comments reinforced positive Likert scale results, indicating that students felt that the "*thinking hat*" promoted critical thinking, recognition of diverse backgrounds and experiences, communication skills, and class participation (Table IV). The most common negative themes in the students' feedback about the "*thinking hat*" were lack of comfort with the debate structure or the public nature of the debates. Detailed student comments can be shared upon request.

Table IV: A thematic analysis of the open-ended survey questions

Survey questions	Total responses that mentioned this theme* (%)
Benefits of "*Thinking Hat*"	
Increases empathy	37
It aids students in understanding information more in-depth including the application of material and reinforces critical thinking.	27
Increases classroom involvement.	12
Evokes team building and strengthens communication skills.	13
Suggestions to improve "*Thinking Hat*"	
Could be improved in the organisation and structure of the activity, such as providing an activity outline.	17
Activity relies on each student preparing – some students reported time constraints due to other school activities, giving an inability to prepare thoroughly.	13
Should have allowed students to choose their debate side to promote student enthusiasm.	8
Certain limitations to an online format such as lack of perception of body language or other cues.	5
More time	2
Classroom logistics (facing each other)	1

*209 students completed the survey among the three institutions, 156 students entered answers to the open-ended questions, and percentages were calculated out of 156 student responses. If a student included in the comment more than one theme, the theme was counted in each category without affecting the total number.

Discussion

The desired outcome of the "*thinking hat*" debates was to foster critical thinking and cultural competence (Green & Klug, 1990; Tervalon & Murray-Garcia, 1998; Lieberman *et al.*, 2000; Darby, 2007; Mamtani *et al.*, 2015; Prasad *et al.*, 2016; Rizzolo *et al.*, 2022;). Students' feedback supported the achievement of the outcomes and was aligned with previous reports (Green & Klug, 1990; Lieberman *et al.*, 2000; Darby, 2007; Mamtani *et al.* 2015). The "*thinking hat*" debate tool also encouraged student engagement with controversial topics, including DEIA (Diversity, Equity, Inclusion and Anti-racism). Faculty facilitators role model cultural humility and dedication to inclusiveness in the classroom and practice. Moreover, non-facilitator faculty members who observed the experience, noted that students were more engaged, motivated, and participated more than they had seen in recent didactic courses, especially in the online environment.

It is important to note the adaptability of the "*thinking hat*" approach as it fills an important gap in the literature. Here the investigators have demonstrated utilising the "*thinking hat*" debates in large and small sample sizes across a diversity of pharmacy programmes, in different areas of the country, in person and online, and with variability among the student cohorts (students' group size, students' background including age, socioeconomic background, ethnicity or race), which differentiates this study from previously published work (Crockett, 2017; Dy-Boarman *et al.*, 2018; Nisly & Costello, 2018; Ang *et al.*, 2019; Hamilton *et al.*, 2020). These results support previous findings with debates and showed that the "*thinking hat*" as a teaching tool was received positively among students overall across its varied offerings (Ong & Narasimhan, 2010). Furthermore, students credited preparation for the debates (e.g. discussions with their peers) and implementation of the "*thinking hat*" as a rationale for changing opinions. Utilising this approach

to measuring position change has also been previously described in the literature (Bond *et al.*, 2022).

Students have varying individual experiences with the "*hats*", and this could have impacted the activity outcomes. For example, pharmacy students are well-versed in the importance of preventative healthcare, such as vaccinations, yet some students were assigned to argue "*against*" vaccination mandates. Students in that group would have had a more difficult experience, but an increased understanding of opposing viewpoints.

Several challenges were noted, per student feedback, and will be addressed in future "*thinking hat*" experiences, if possible. Some students felt there was a lack of instruction regarding the basic principles of the "*thinking hat*" structure. This will be addressed with clearer instructions or by providing examples of debates (e.g. showing past examples and YouTube videos). A subset of students noted that they did not have the time to adequately prepare for the activity, which can be easily addressed by providing instructions earlier in advance of the event. A small portion of students critiqued the assignment of "*hats*" and indicated that their enthusiasm would have been greater if they were allowed to choose their "*hat*". Yet most students commented that being assigned a stance allowed for further exploration and understanding of the opposition's point of view, a result that encouraged the investigators of this project to continue with the approach of assigning the different points of view.

The topics for these debates were intentionally chosen as topics of controversy impacted by DEIA. Discussions about these topics, using the "*hat*" assignments, increased students' self-awareness and provided opportunities for further reflection by the students. This also allowed for the facilitator and peer clarification of student misconceptions (e.g. identification of groups opposed to vaccination mandates). Future directions will focus on analysing reflections and students' evolution across the different debates offered in the curriculum.

The "*thinking hat*" approach in these settings supported the development of multiple CAPE (Clinical Advancement for Professional Excellence) competencies of the United States Accreditation Council of Pharmacy Education, notably 1 (knowledge), 3.5 (cultural sensitivity), 3.6 (communication), and 4.4 (professionalism). The experience also prepared students to address practice care (Standards 2.1, 2.3, 2.4) and future diverse populations (Medina *et al.*, 2013).

Conclusion

Debates are an effective teaching method to promote critical and diverse thinking, improve communication skills, enhance the ability to work in a team and give students a more in-depth understanding of the material. This study provides lessons learned from implementing an alternative educational design, the "*thinking hat*" that could be offered in a classroom setting using any modality (in person, synchronous or asynchronous). Results found that students believed this activity improved critical thinking, and empathy for diverse viewpoints, cultivated skills, and promoted classroom involvement. This study was shown to be applicable across a wide variety of settings due to being conducted in multiple locations and could be implemented in pharmacy curricula in the future.

Conflict of interest

The authors have no conflicts of interest to disclose.

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Appendix A: Institution A instructions

Vaccination instructions

For our Practicum session, we will run a debate about vaccination, "*for*" and *"against*" vaccination, particularly, let's focus this year on COVID-19 vaccines. This time, we will be using a "thinking-hat" approach. You are randomly assigned to one of the following scenarios in teams of three to four (see at the end of the document for the teams' assignments). To further guide you, I have listed some questions to help you when preparing for the debate:

Healthcare provider "*against*" or "*for*" vaccines

Policymaker "*against*" or "*for*" vaccines (clue: think about all the controversies that you can find in the media about schools determining if all children should be vaccinated to attend school or not), or recall your legislation days.

Pharmaceutical companies "*against*" or "*for*" vaccines

Racial and Ethnic minority -patients "*against*" or "*for*" vaccines. (you can select parent or patient, but you need to be a minority)

You will need to come prepared for this practicum, remember that one point of this practicum is preparation and presentation/participation. I will also provide the first 30 min of the practicum for your teams to gather all the information together, and then we will have the rest of the 1.5 hours for debate.

The purpose of this debate is to prepare you better to face patients coming to the pharmacy with concerns that they found in the media. By knowing what is out there, you will be much better prepared to discern what is solid and robust vs. rumors or non-foundational observations as well as help you develop further critical thinking skills.

There is a lot of information available in the media. Feel free to reach out to any resource. If you are in the "*for*" teams, would recommend you also search for "*anti*" that way you will be better prepared to address the "*anti*" arguments, and vice versa. These are some resources that I encourage you to watch: *"Vaxxed"; "Vaccine Nation", "Silent Epidemic", "Frontline/Vaccine War",* and *"The Greater Good"* are very controversial movies/documentaries that you could look at and some of them are accessible through u-tube. If you search on YouTube, you can also see what patients are looking for right now for COVID-19 vaccination. I would encourage you to use the *"incognito"* search modality, so you do not get too much junk email afterwards.

Questions to reflect on when preparing for debate (not restricted, you can identify further):

For minorities

Try to read about the Tuskegee case (*https://www.cdc.gov/tuskegee/timeline.htm*) or the Nuremberg Code. Is the vaccine distribution equally accessible to everyone?

For policymakers

Can the COVID-19 vaccine be required to utilise public services? (e.g. public school system).

Should employers be able to mandate that their employees get the COVID-19 vaccination when they are eligible?

Can airlines require proof of COVID-19 vaccination for air travel?

For pharmaceutical companies

Cost/revenue? Is it ethical for certain countries to receive access to vaccines in exchange for sharing anonymous patient data?

For healthcare providers

Is it ethical to use a vaccine that has not been studied for long-term implications?

How to educate patients with all the available information through social media?

Table I: Student assignments for the "*thinking hat*" debate

Identity	For	Against
Pharmacist/ Healthcare provider	student 1	student 4
	student 2	student 5
	student 3	student 6
Underrepresented patients or parent	student 7	student 10
	student 8	student 11
	student 9	student 12
Pharmaceutical company	student 13	student 16
	student 14	student 17
	student 15	student 18
Policymaker/advocacy	student 19	student 22
	student 20	student 23
	student 2	student 24

Three activities will determine your score in this practicum, and both need to be completed to pass the practicum (i.e. preparation + participation and reflection):

1. How well prepared you came and your participation during the debate (*refer to the rubric*). The content and the way of talking will be taken into consideration to grade the activity. Please, be respectful. The topic can become really "*hot*" but you are a professional after all. It is expected that each member of the team actively participates in the debate (i.e. we need to hear each of you talking) (rubric attached- SBT verbal communication), and to keep attentive during the Zoom session.

2. A self-reflection of what you learned from the activity (see rubric below).

3. Instructions for self-reflection
   Two pages, Times New Roman, 11 ft size, single space (you can space six points between paragraphs to facilitate the reading). (*Refer to the rubric).*
   The self-reflection about vaccinations should include:
   1. How you prepared for the debate including links to the sources
   2. Your assigned thinking hat and points that you found/defended.
   3. How the points discussed by other teams have affected your perspective on vaccinations? Please use a meaningful/thoughtful approach.
   4. Reflect on how your assigned "*thinking hat*" has influenced your experience, and how this exercise could help you in the future as a pharmacist.
   Remember that the English will also be graded for this practicum, so please, review for typos.

Appendix B: Institution B instructions

Whole genome sequencing and precision medicine debate

The purpose of this debate is to prepare you better to face patients coming to the clinic with concerns that they found in the media. By knowing what is out there, you will be much better prepared to discern what is solid and robust vs rumours or non-foundational observations as well as help you develop further critical thinking skills.

We will run a debate about personalised medicine, "*for*" and "*against*". You are randomly assigned to one of the following scenarios in teams of five to six.

Table I: Student assignments for the "*thinking hat*" debate

Identity	Scenario (25 minutes each)	For	Against
Pharmacist one	The benefits of genetic sequencing exceed the risks in personalised medicine.	student 1 student 2 student 3 student 4 student 5	student 6 student 7 student 8 student 9 student 10
Racial or ethnic minority (You can select any underrepresented population)	The benefits of genetic sequencing exceed the risks in personalised medicine.	student 11 student 12 student 13 student 14 student 15	student 16 student 17 student 18 student 19 student 20
Prescriber	The benefits of genetic sequencing exceed the risks in personalised medicine.	student 21 student 22 student 23 student 24 student 25	student 26 student 27 student 28 student 29 student 30
Patient	The benefits of genetic sequencing exceed the risks in personalised medicine.	student 31 student 32 student 33 student 34 student 35	student 36 student 37 student 38 student 39 student 40
Insurer	The benefits of genetic sequencing exceed the risks in personalised medicine.	student 41 student 42 student 43 student 44 student 45 student 46	student 47 student 48 student 49 student 50 student 51 student 52
Pharmacist Two	The benefits of genetic sequencing exceed the risks in personalised medicine.	student 53 student 54	student 55 student 56

You will need to come prepared for this debate. You will have to work with your team ahead of time to gather all the information together. If you are an online student, your debate will be a discussion board and you do not need to work as a team. *Your weekly attendance and seminar quiz will be determined by your preparation for the debate.*

Logistics

Only two topics will be debated synchronously, while the other three will be debated asynchronously using discussion boards in Canvas. The synchronous versus asynchronous topics will be determined at the start of class, I will pick the topics out of a "*hat*". Therefore you must prepare as though you are going to be debating synchronously.

Synchronous directions:

1. The "*for*" group receives five minutes to present their case to the audience.
2. The "*against*" group then receives five minutes to present their case.
3. After both sides have a chance to speak, both teams receive five minutes to prepare a rebuttal and summary.
4. The order of speech is reversed now and the "*against*" side presents their rebuttal and summary for the first five minutes.

5. The last to speak is the "*for*" team who then presents their rebuttal and summary for five minutes.
6. The debate is now concluded.

Asynchronous directions:

1. After class I will create discussion boards for the topics that we did not do synchronously.
2. You must post if you are "*for*" or "*against*" and state your case/evidence.
3. You must respond to at least one comment from the opposing side (i.e. rebuttal).
4. You have one week to complete the asynchronous debate.

Resources:
There is a lot of information available in the media. Feel free to use any resource. If you are in the "*for*" teams, would recommend you also search for "*anti*" that way you will be better prepared to address the "*anti*" arguments, and vice versa. To further guide you, I have listed some resources to help you when preparing for the debate:

- https://unlockinglifescode.org/wdyt/#/home.

If you have Netflix access, try to watch one of the episodes of "*Unnatural Selection*" or the movie "*GATTACA*". If you do not have access, don't worry, there are additional resources below.

Precision medicine initiative: PM Initiative I, PM Initiative II, PM Initiative III, PM Initiative IV

For healthcare providers

Consider the liability of doing a sequence test or not.

How to educate patients with all the available information through social media?

For Insurers

Policy one

Should employers be able to mandate that their employees genetic testing when they are eligible? GINA, GINA II.

Should voluntary genetic testing be rewarded in wellness programs? (Wellness I, Wellness II, Wellness III, Wellness IV)

For minorities

- Consider the Tuskegee case
- Nuremberg Code, eugenics
- Native Americans, tribal governments (NA I, NA II)
- Bidil for African Americans (The short life of a race drug)

Appendix C: Institution C instructions

Whole genome sequencing and precision medicine debate

The purpose of this debate is to prepare you better to face patients coming to the clinic with concerns that they found in the media or from direct-to-consumer testing companies. By knowing what is out there, you will be much better prepared to discern what is solid and robust vs. rumors or non-foundational observations as well as help you develop further critical thinking skills.

We will run a debate about genetic sequencing in precision medicine, "*for*" and "*against*". You are randomly assigned to one of the following scenarios in teams of two or three.

Table I: Student assignments for the "*thinking hat*" debate

Identity	Scenario (15 minutes each)	For	Against
Pharmacist one	The benefits of genetic sequencing exceed the risks in precision medicine.	Group 1	Group 2
Underrepresented population/minority (you can select any underrepresented population)	The benefits of genetic sequencing exceed the risks in precision medicine.	Group 3	Group 4
Prescriber	The benefits of genetic sequencing exceed the risks in precision medicine.	Group 5	Group 6
Patient	The benefits of genetic sequencing exceed the risks in precision medicine.	Group 7	Group 8
Insurer	The benefits of genetic sequencing exceed the risks in precision medicine.	Group 9	Group 10

You will need to come prepared for this debate. You will have to work with your team ahead of time to gather all the information together. Topics will be debated during the class session.

Directions:

1. The "*for*" group receives four minutes to present their case to the audience.

2. The "*against*" group then receives four minutes to present their case.

3. After both sides have a chance to speak, both teams receive three minutes to prepare a rebuttal and summary.

4. The order of speech is reversed now and the "*against*" side presents their rebuttal and summary for the first two and a half minutes.

5. The last to speak is the "*for*" team who then presents their rebuttal and summary for two and a half minutes.

6. The debate is now concluded.

Three activities will determine your score for this activity: Preparation, Participation, and Reflection:

Preparation:

How well prepared you came for the debate (refer to the rubric). The content and the way it is presented will be taken into consideration to grade the activity. Please, be respectful and agree to disagree. Remain professional at all times.

Participation

It is expected that EACH member of the team actively participates in the debate (i.e. I need to hear each of you talking) (rubric attached-SBT verbal communication). In addition, remain attentive during the other debates.

Self-reflection

A self-reflection of what you learned from the activity (see rubric below). The self-reflection is due on 4/28/2022 so you have plenty of time to submit it.

Instructions for the self-reflection

Two pages**,** Times New Roman, 11 ft size, single space (you can space six points between paragraphs to facilitate the reading). (*Refer to the rubric*)

The self-reflection about genetic testing should include:

1. How you prepared for the debate (including links to the sources)

2. Your assigned thinking hat and points that you found/defended.

3. How the points discussed by other teams have affected your perspective on genetic sequencing? Please use a meaningful/thoughtful approach.

4. Reflect on how your assigned "*thinking hat*" has influenced your experience, and how this exercise could help you in the future as a pharmacist.

Resources

There is a lot of information available in the media. Feel free to use any resource. If you are in the "*for*" teams, would recommend you also search for "*anti*" that way you will be better prepared to address the "anti" arguments, and vice versa. To further guide you, below is a list of some possible resources to help you when preparing for the debate:

- https://unlockinglifescode.org/wdyt/#/home.
- https://www.yourgenome.org/debates/is-it-ethical-to-have-a-national-dna-database
- If you have Netflix access, try to watch one of the episodes of "Unnatural Selection" or the movie "*GATTACA*". If you do not have access, don't worry, there are additional resources below.
- Ancillary and incidental findings: Findings I, Findings Two
- Precision medicine initiative: PM Initiative I, PM Initiative II, PM Initiative III, PM Initiative IV
- Genetics and Criminal Investigation: Criminal I, Criminal II

For healthcare providers

- Consider the liability of doing a sequence test or not.
- How to educate patients with all the available information through social media?

For Insurers

Policy One

Should employers be able to mandate that their employees get genetic testing when they are eligible? GINA, GINA II

Should voluntary genetic testing be rewarded in wellness programs? (Wellness I, Wellness II, Wellness III, Wellness IV)

For minorities

- Consider the Tuskegee case
- Nuremberg Code, eugenics
- Native Americans, tribal governments (NA I, NA II)
- Bidil for African Americans (The short life of a race drug)
- Science and Genetics and Race

Appendix D: Debate presentation rubric for Institutions A, B, and C

Table IV: Rubric for debate participation

Performance criteria	Excellent	Good	Fair	Poor
Communication	The spokesman uses complete sentences, organization is clear and thoughtful, and tone is clear and respectful.	The spokesman uses complete sentences, and organisation is evident, but some errors. The tone is clear and respectful.	The spokesman uses complete sentences, and his statements are comprehensible. The organization could be improved to present a more coherent argument. The tone is respectful.	The spokesman is using incomplete sentences, is unstructured, and the content includes errors. The tone is not respectful.
Participation in the debate	Provides comments, discussion, questions, and new information on a regular and active during the debate.	Provides comments, discussion, questions, and new information on a fairly regular basis during the debate.	Provides comments, and some new information on a sporadic basis during the debate.	Provides minimal comments and information to other participants of the debate.
Content of the arguments	Demonstrates a solid understanding of the concepts, topics, and ideas as evidenced by thoughtful responses and questions that show a clear connection with the course material at hand. The comments show depth and include many supporting details.	Demonstrates an adequate understanding of the concepts, topics, and ideas as evidenced by commenting on superficial, or general statements in the debate. The summary and comments include a few details.	Demonstrates a restricted understanding of the concepts, topics, and ideas as evidenced by providing repetitive information and/or including highly general comments.	Gives a general or superficial comment that is unrelated to the debate at hand and the content of the summary is poor.
Critical thinking	Demonstrates a critical analysis of an idea brought up during the debate or introduces a different interpretation of an existing concept or idea. Provides comments, discussion, and questions that have a clear connection (are integrated) with the course material at hand.	Indicates agreement or disagreement with the existing discussion on the debate including a limited explanation or justification. Provides comments, discussion, and questions without a clear connection to the course material at hand.	Indicates agreement or disagreement with the existing discussion on the debate but provides no justification or explanation for comments.	Provides no evidence of agreement or disagreement with the existing discussion on the debate.

Appendix E: Debate written reflection rubric for Institutions A and C

Table V: Rubric for self-reflection assignment

	Excellent	Good	Fair	Poor
Critical thinking	Demonstrates a critical analysis of an idea brought up during the debate or introduces a different interpretation of an existing concept or idea.	Indicates agreement or disagreement with the existing discussion on the debate including a limited explanation or justification.	Indicates agreement or disagreement with the existing discussion on the debate but provides no justification or explanation for comments.	Provides no evidence of agreement or disagreement with the existing discussion on the debate.
Content	Information provided is accurate, solid scientific background and validated information reflects the course material and is of superb quality	Information provided is accurate, but does not reflect the course material or sometimes contains extraneous details or not solid information	Information provided is not always accurate, does not reflect the course material, and is of limited overall value	Information provided is inaccurate, does not reflect pertinent course material, and is of poor quality
Grammar	Overall writing technique has no misspellings.	Overall writing technique has few (one/two) misspellings.	Overall writing technique has several (three/four) misspellings.	Overall writing technique is poor with many (>4) misspellings.
Thoughtful/ meaningful	Students elaborate on a meaningful reflection.	Students elaborate a partial meaningful reflection, using "*empty words*" or partially thoughtful.	Overall thoughtful quality of the reflection is low	Reflection is not thoughtful at all
Accountability	Fully and completely describe their role on the team and how they helped to improve the team's debate and overall cohesiveness	Explains their role and gives a limited view of how or why this was vital to the team's success	Provides a vague or limited explanation of their role on the team and does not provide information on why this helped the team	Does not explain the role of the team or how this helped the team
Impact	Student describes how the debate has aided in maintaining or changing his/her point of view about genetic sequencing, and how to assist patients/others that think opposite to student's perspective	Student describes how the debate has aided in maintaining or changing his/her point of view about genetic sequencing, but not how to assist patients/others that think opposite to student's perspective, or vice versa	Student describes poorly both how the debate has aided in maintaining or changing his/her point of view about genetic sequencing, and how to assist patients/others that think opposite to the student's perspective	Student does not describe how the debate has aided in maintaining or changing his/her point of view about genetic sequencing, nor how to assist patients/others that think opposite to the student's perspective