Tool-Kit Assisted Hygienic Menstrual Practices through Design Thinking of Social Innovation Course

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Abstract— **Social problems have been a part of the society since ages and efforts to address them have been on practice along with. The evolution of knowledge society and the technology have enabled better ways of addressing such problems. In this context, the present study " Design Thinking for Social Innovation" was undertaken by Freshman students of undergraduate engineering students to identify a relevant social challenge and address it with the aid of design thinking process. Inadequate awareness and education about hygienic menstrual practices is one such major but less discussed social problem among the various gender-specific issues. Despite the modern days advancement with digital tools and social media, social taboos, misbeliefs and unwarranted phobias pertaining to the phenomenon are widely prevalent in several sections of the society. The different phases of design thinking: Empathy, Define, Ideate and Prototype were employed for understanding the insights and different dimensions of the challenge. The different stakeholders of the challenge, possible ideas and solutions were generated through the process. Finally an organized solution in the form of designing an informative website and tool-kit containing the key menstrual products and their demonstration was implemented as part of solution. The stakeholders were educated about menstruation, hygienic menstrual practices and their myths were busted as part of the exercise. The student team gained an immersive experience of identifying and addressing a social challenge using design thinking process.**

Keywords— **Design thinking; Empathy, Menstruation; Social innovation; Stakeholders**
JEET Category— **Practice**

I. INTRODUCTION

A social problem is any condition or behavior that has negative consequences for large numbers of people and that is generally recognized as a condition or behavior that needs to be addressed. Social innovation refers to the design and implementation of new solutions that imply conceptual, process, product, or organisational change, which ultimately aim to improve the welfare and wellbeing of individuals and communities.

Many initiatives undertaken by the social economy and by the civil society have proven to be innovative in dealing with socio-economic and environmental problems, while contributing to economic development (Phills, 2008).

Menstruation has long remained a conversational taboo across India, resulting in inadequate dissemination of menstrual health education. Biologically menstruation is defined as the shedding of the lining of the uterus
(endometrium) accompanied by bleeding which begins with puberty and occurs in monthly cycles throughout a woman's reproductive cycle, except during pregnancy. Menarche is the first menstruation of the human female on the attainment of puberty. It is a complex process of growing up marked by vital biological and physical changes. It is associated with considerable amount of anxiety, emotional problems, and need for support (Deo and Ghattargi, 2005).

Conversing and learning regarding menarche and menstrual health with the stakeholders is considered as sensitive, personal and a forbidden issue at both public and private levels.. In developing countries like India, more so among the traditional families, the societal norms related to practice during menstruation are very limiting and governed by orthodox beliefs. Most young women are unaware of basic tenets of menstrual health like the duration of menstrual period, normal cycle length of menstruation, source of menstrual blood (Fehintola et al., 2017; Shoor, 2017). abnormalities, characteristics and risks associated with late detection of the cycles and the hygienic practices to be adopted during menstruation. Cultural taboos add to girls' difficulties, preventing them from seeking help and impose restrictions on their diet and activities when menstruating Improper management may often result in health issues involving the urinary and genital tracts (Narayan etal, 2001).

These gaps in knowledge demonstrate the need for health education and creating awareness related to menstruation and hygienic practices including menstrual flow monitoring. The formal system of education has limited scope of information and awareness related to menstruation and hygiene management (Oakley, 1995). There has been a minimal attention given to the significance of menstruation to adolescent girls as they transition through puberty. While the global average age of menarche is dropping, the same is simultaneously rising. This calls for an earnest need for menstrual health education and hygiene management among the stakeholders. Such a knowledge and awareness of menstrual health enables the women to adopt hygienic practices, use of appropriate apparels & accessories , bust the myth & taboos about menstruation and create attitudes that lead to positive behavioral changes. (Langer et al., 2015).

Menarche is a part of the complex process of growing up marked by vital biological and physical changes. With these changes comes a considerable amount of anxiety, emotional problems, and need for support. Premenstrual discomfort, menstrual symptoms, and associated gynecological disorders also have important medical and social consequences that influence adolescent females' life in a major way (e.g., loss of school days, isolation, prolonged bed rest, reproductive tract infections, chronic sleep disturbance, and decreased appetite). In addition, lack of knowledge about menstruation is associated with profound psychological and reproductive health issues (Deo & Ghattargi, 2005)

These concerns for menstrual hygiene management has led the governments, social community, medical professionals, NGO's and academic institutions to initiate various programs to be implemented in communities and schools, to create awareness among the menstruating adolescents.

To address limiting norms and limited awareness, the Government of India, has adopted Menstrual Hygiene Management (MHM) guidelines, which underscores the need for access to education, and awareness at multiple levels (individual, family, and community). Various non-governmental organizations (NGOs) including *Sachhi Saheli* (http://sachhisaheli.org/,2017), TARSHI, (http://www.tarshi.net/.2017), Menstrupedia (https://www.menstrupedia.com/, 2023) and Vikalp Design (http://www.vikalpdesign.com/seedhi_satchi_ baath.html) have created educational content, and conduct awareness drives and workshops. Feature films with message of social concern like the Pad Man of India, the journey of Arunachalam Muruganantham are playing a key role in educating the stakeholders. These initiatives do expand awareness and acceptability, but many more such are needed.

The present study attempts to address this issue of creating awareness about menstruation through design thinking approach. Stanford's D school defines design thinking as a methodology for creative problem solving. It is based on five principles: 1. Empathize (Working to fully understand the experience of the user for whom we are designing) 2. Define (stating the users' needs and problems), 3.Ideate (Exploring a wide variety of possible solutions through brainstorming), 4. Prototype (Transforming the ideas into physical form) and 5. Test. (Trying out high-resolution products and use observations and feedback to refine the prototypes)

Design thinking incorporates constituent insights in depth aimed at getting beyond the assumptions that hinder effective solutions. As a practice, it involves co-creating products or services in constant consultation with users (Hillgren et al., 2011)

It is inherently optimistic, constructive, and experiential and addresses the needs of the people who will consume a product or service and the infrastructure that enables it. Fig.1 outlines the stages of Stanford d school design thinking process.
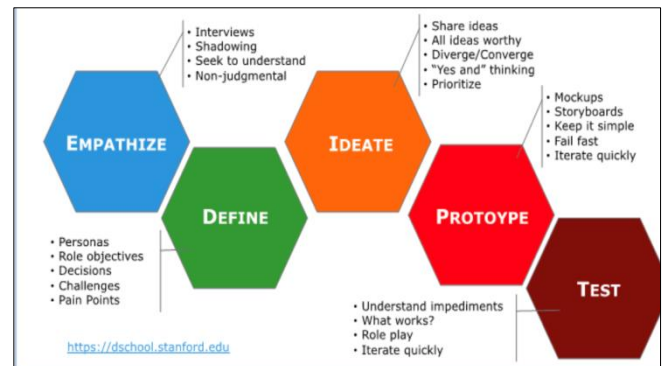

Fig 1. Stanford d school design thinking process.

Social issues are often complex problems, which have multiple dimensions, which need to considered while working on the solution. Design thinking offers an all-inclusive approach and hence method of choice for being widely used for social innovation. It is a collaborative approach for solving complex problems (Manzini,2016). Social innovation has brought in a new dimension to design thinking process and vice versa. It is a centrally connected approach to working on societal challenges (Murray, Caulier-Grice, and Mulgan 2010). It needs mindfulness, observational and critical evaluation skills, physical and mental agility, resilience, and a collective approach. It is an open-ended process that relies on dynamic, interconnected communities of people. It has recently received significant prominence from practitioners due to its propensity to connect both organizations and users in the local context (Johansson-Sköldberg, Woodilla & Çetinkaya 2013).

One such example of practice of design thinking for social innovation related to menstruation was implemented by a social organization, *Goonj*, which collected the waste clothes from urban areas and remodeled them to prepare sanitary napkins for women in rural sectors who face hardship due to lack of clean cloth for their menstrual maintenance (Kummitha, 2019).

Given the gravity of the situation, the present study endeavors to shed light on the existing challenges and knowledge gaps surrounding menstrual health and hygiene in a selected locality- Narayanpur, Dharwad, Karnataka. By, it was planned and ultimately uplift the overall well-being of the

women in the community. This study serves as a stepping stone towards initiating informed conversations and instigating positive changes regarding menstrual health and hygiene in under-served communities.

The key objectives of the study were:
1. To gain a deeper understanding of the stakeholders and develop targeted interventions to improve menstrual awareness and promote hygienic practices.
1. 2. To educate the menstruating women and other people about the available products around them and provide women with the affordable and safe products to lead hygienic and healthy lifestyle.
3. To bust the myths and misconceptions about menstruation.

II. METHODOLOGY

The research seeks to explore the level of knowledge on menstrual awareness and hygiene practices of women in reproductive age.The project was conducted as a part of Design Thinking for Social Innovation course of two credits for Freshman students of undergraduate engineering students.

A. Group dynamics

The project was implemented with a group of four students from diverse engineering branches in each team. The composition of the team was a heterogeneous blend in terms of gender, locality and academic scores. This helped in avoiding the skewness and enabling an optimum performance of all the groups involved. Various themes (agriculture, health, education, environment, transport, street business etc.) were allotted to the teams and sent for respective community visits.

B. Design Thinking Model

The research seeks to explore the level of knowledge on menstrual awareness and hygiene practices of women in reproductive age. A five phase design thinking approach , derived from Stanford d school of design thinking was adopted for the project.

C. Empathy

Empathy is a fundamental concept that refers to the ability to understand and share the feelings, perspectives, and experiences of others, especially the target beneficiaries or the community being served. It involves putting oneself in the shoes of the people being impacted by a problem or those who will benefit from a proposed solution. It plays a central role in the human-centered approach. It is the foundation which helps in building meaningful and impactful solutions. By empathizing with the needs, challenges, and aspirations of the individuals involved it was possible to gain valuable insights into the entire problem-solving process. It allows us to approach complex problems with humility, respect, and a genuine desire to make a positive impact on people's lives. By integrating empathy into the problem solving process, it helps to frame transformative and inclusive solutions that address real-world challenges in a more meaningful way.

1). Identifying the social challenge, stakeholders and creation of stakeholder map

The team undertook multiple community visits at different locations to explore social challenge and made presentation to the course supervisor. One social challenge was finalized taking feasibility, budget and time constraints into consideration and taken forward for the project with design thinking approach.

A small settlement in Narayanpur, a location in the suburb of Dharwad city was identified and multiple field visits by group members were undertaken and interaction conducted with the women who were the stakeholders. It was observed that there was a lack of awareness regarding the menstrual health and hygiene. This had a direct impact on the health of the menstruating women. Notably, low income, poor education, orthodox beliefs, taboos and stigma were the main barriers for the issue. Upon interaction with them, different categories of stakeholders (any person or community or group who is impacted, both negatively or positively by an issue) were identified:

1. **Primary stakeholders**: Menstruating women (women in the reproductive age group)
2. **Secondary stakeholders:** Elderly caretakers and family members
3. **Tertiary stakeholders:** Family physicians

The following points were taken into consideration during community visits as part of empathy

a) View and analyze situations objectively b). leave out preconceptions and assumptions c). be aware of biases and overcome them d). question everything but do not judge and e). have an open mind while listening. The team members interacted and interviewed with open-ended questions. More emphasis was laid on extreme users (non-typical) since they were more prone to run into all dimensions of the problems. The emotions and motivations were grasped and analyzed during the conversations. Detailed information regarding the stakeholders information, their activities and the environment in which they operate or work was documented.

Appropriate questionnaire was developed to identify and gather adequate information about the stakeholders. A stakeholder map reflecting the social challenge was developed based on the information collected and analyzed. Subsequent to multiple community visits, the questionnaire was appropriately modified and stakeholder map was updated. Thus, the social challenge and the stakeholders involved were identified through community visits, engagement and observation as part of empathy phase.

2. Dimensions of empathy and reflections activity

The empathy was developed with three dimensions.
1).Cognitive- knowing or understanding what another person is feeling, 2). Affective- feeling of concern for another person and 3). Behavioural -the action of responding based on cognitive and effective empathy.

Reflections activity was undertaken by individual students which involved each student to assume in the position of primary stakeholder and recording the feelings and emotions as to how did they feel about the problem identified and interaction with the student team members.

D. Define

1. Framing Point of View (PoV) statement

As part of define phase, a PoV was framed. PoV is a meaningful and actionable statement, which the design thinker will focus on solving. It requires synthesis of the observations about the users from Empathy Phase. A well framed PoV of the problem statement will guide the team's work and kick start the ideation process in the right direction. It is composed of three elements:1). User- defines the type of person for whom the design is made, 2). Needs- Unmet needs of the user and 3). Insights- describes the reasons of the behaviour which helps in explaining the need. The PoV statement helped in data synthesis by deriving insights about the users and distil their critical needs.

2. Data synthesis and creation of affinity map
Conscious efforts were made to collect the data which was useful in terms of information involving users' beliefs & values, aspirations, habits, challenges and motivation. Data analysis which involved breaking down complex concepts and problems into smaller, easier-to-understand constituents and data synthesis which comprises of creatively piecing the puzzle together to form whole ideas was performed. It may be noted that data analysis happens during the empathy phase and synthesis takes place during the define phase when the data was organized and interpreted to create the PoV statement.
An affinity map which was a collection of large amounts of data was organized into groups or themes based on the relationships which helped in getting a closer clarity of the challenges or problems faced by the stakeholders.

3. Stakeholders persona
A persona is a description of a fictional person that represents one target segment for whom a product or service is being developed. Different stakeholders persona were created for the purpose of understanding users' needs, behaviours and goals with the objective of providing a good user experience of the product being developed. Multiple stakeholder persona were created to understand the different dimensions of the social problems or challenges identified.

4. Empathy map
An empathy map which is a collaborative visualization used to articulate what we know about a particular type of user or group of users was generated. It externalizes knowledge about users in order to 1) create a shared understanding of user needs, and 2) aid in decision making. The four elements of the two dimensions (pain and gain points) are shown in Fig. 2.
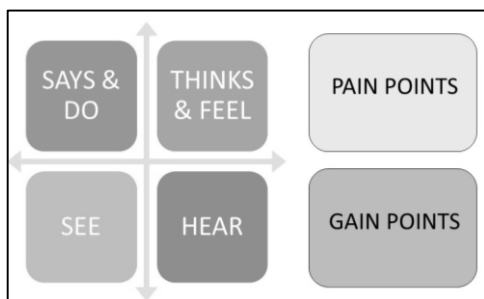

Fig. 2. Empathy map of stakeholders

Empathy map was created by revisiting the themes and contents of the affinity map. They are created by combining multiple individual empathy maps from users who exhibit similar behaviours and grouped into one segment. They capture one particular user or reflect a collection of multiple users.

E. Ideation
Stanford d school of design defines ideation as a mode of the design process which focusses on idea generation which provides both the fuel and also the source material for building prototypes and getting innovative solutions into the hands of the users. It is the stage where the design thinkers spark off ideas by exploring and identifying the possible ideas.. It is the transition between understanding the problems that users have and generating ideas for those problems. The main aim of the Ideation stage was to use creativity and innovation in order to develop solutions. Figure 3 shows stages of ideation used in design thinking process.
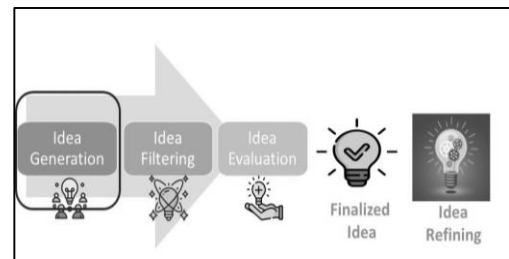

Fig. 3. Stages of ideation

1. Brainstorming
Brainstorming tool of ideation was used to devise new ideas. It was a very useful tool to generate many ideas by leveraging the collective thinking of the group, engaging with each other, listening, and building on other ideas. Various possible ideas were generated and pooled keeping PoV at the center of the process.

2. Idea filtering
Brainstorming resulted in a pool of ideas which was difficult to arrive at a single solution and evaluate. Hence Idea Filtering technique to filter all the wild ideas was employed. It is a visual method based on "Feasibility" and "Impact on the problem" for selecting the best idea. The method aims to generate a discussion in the group based on the characteristics of ideas and the organization's priority.

Impact-Feasibility technique was used to shortlist the ideas generated. It facilitated the group discussion of ideas that have the highest benefit or impact for the least effort or cost in terms of both time and expense. The Two important factors in Impact & Feasibility Analysis were Impact- measuring the degree of positive impact the idea has in solving the identified social challenge and Feasibility- measuring the degree to which the idea is actually doable(In terms of cost and time). Fig. 4 shows the Impact-Feasibility technique followed for the process.
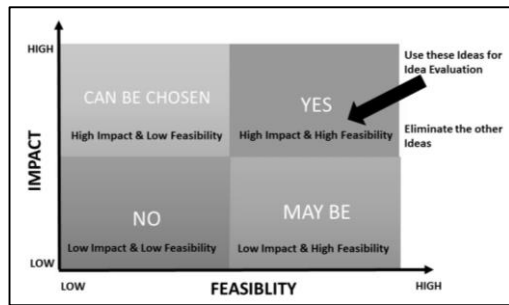
Fig. 4. Impact versus feasibility method for shortlisting ideas

Having pruned the ideas, the ideation stage had reached a convergent stage and they needed to be evaluated, compared, ranked and clustered. The objective was to spot the potential winners, or combinations of winning attributes, from a number of ideas. Factor versus suitability technique was used for selection of best idea. Further, a score matrix with factors and suitability parameters was used as shown in Table 1 and most suitable idea was selected.

SCAMPER method was used to refine the Idea finalised by Factor Versus Feasibility analysis. The elements of SCAMPER method were

S- Substitute (Replace or substitute main component for another),

C - Combine (Combine two or more elements into one),

A - Adapt (Cause the main elements to adapt to external stimuli or an community demand),

M - Modify (How are we changing the size or properties of the initial concept?),

P - Put to another use (How can we use the elements in different ways?),

E - Eliminate (Eliminate elements to see how it affects our main concept),

R – Reverse/Reuse (Flipping things around to see them differently),

The idea was subjected to feedback again by the stakeholder through a systematic questionnaire designed for the purpose with the objective of giving a good user experience. Any significant observations from the feedback was recorded and the changes were incorporated to the idea accordingly.

F. Prototype

Prototyping is a way of quickly developing a scale down version of the solution and testing whether the selected idea is workable. Ideas are converted to solutions in tangible form wherein the designers implement ideas for their target group. It is the transition between finalized ideas and implementing solution. In order to build the prototype based on the finalized idea the first step was to break down the solution to individual elements and write down the specifications. The target group and the age-band of the primary users were taken into consideration while prototyping.

An action plan in the form of checklist for the steps or tasks that the student members need to complete in order to develop the prototype was laid down with what, how who and when the elements.

III. RESULTS

The student team undertook multiple community visits to different locations to explore social challenges for the study. (Fig.5) Eventually a locality at Narayanpur in the suburb of Dharwad (15.459427 ° N, 74.99336 °E) was selected.

Fig.5. Community visit of social innovation team

Upon interaction with pre-defined questionnaire, lack of proper awareness about menstruation, prevalence of taboos and poor hygienic practices were considered as major social challenge and the different categories of stakeholders (Fig 6.) identified. Menstruating women were the primary stakeholders around which the social challenge and the design process got focussed.
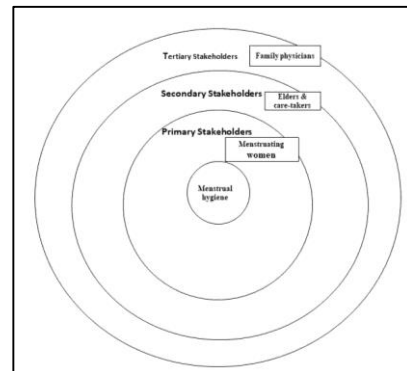

Fig.6. Stakeholders of the social challenge

In Define phase, the data collected in the empathy phase was organised using affinity map which resulted in four key elements as shown in Fig.7.
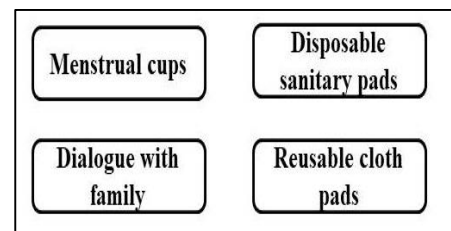

Fig.7. Affinity map of stakeholders

Accordingly the stakeholder persona were developed menstruating women (primary stakeholder), their mothers(secondary stakeholder) and local physician (tertiary stakeholder) with details of their age, occupation and experience during the menstruating periods.

Empathy map developed revealed that the primary stakeholders, menstruating women heard the discussion of

health professionals related to menstrual practices. They felt uncomfortable and worried when they the periods were irregular or too prolonged. They experienced a lot of difficulty in accessibility and affordability of sanitary napkins during the cycles.

Based on the above mentioned exercise, the PoV was deduced as " women of the Narayanpur area need a way to prioritize menstrual health and hygiene to lead a healthy life. They are confronted with lack of awareness and proper information about menstruation, deep-rooted myths and taboos and poor economic condition to avail decent hygienic practices during the menstruation cycles.

PoV- Women of Narayanpur area need a way to prioritize menstrual health and hygiene to lead a healthy life. However, there Is lack of awareness and economical support from the society due to lack of information, hesitation about confronting the issue and mythical beliefs.

In ideation phase, Brainstorming among the team members for possible ideas to address the social challenge resulted in several ideas which included accessible and affordable menstrual produts, creating awareness sessions, counselling activities, economic alternative products related to menstrual practice, use of social media and mobile applications and invoking the assistance of NGO's working in the concerned area.

The impact versus feasibility exercise was undertaken which directed that there is a need for proper education and awareness regarding menstruation and make the menstrual products accessible and affordable to adequately address the social challenge identified for the study.

Factor versus suitability technique adopted to further select the best idea indicated that providing menstrual hygiene tool-kit along with demonstration of their use in vernacular language with scientific and practical information would be an ideal solution for the addressing the social challenge. Table 1.shows the details of the score matrix of the parameters arriving at the best idea.

TABLE I
FACTOR VERSUS SUITABILITY SCORE MATRIX

Criteria	Ranking (1 to 5)	Accessible and Affordable Menstrual Products		Sustainable Alternatives		Telemedicine Services		Collaboration with NGOs		Menstrual Hygiene Toolkits	
	A	Score B	C=A*B	Score D	C=A*D	Score E	C=A*E	Score F	C=A*F	Score G	C=A*G
Affordability	5	5	25	4	20	4	20	3	15	4	20
Sustainability	4	4	16	5	20	4	16	3	12	5	20
Accessibility	5	5	25	4	20	3	15	4	20	4	20
Effectiveness	4	4	16	4	16	5	20	3	12	4	16
Collaboration potential	5	4	20	4	20	4	20	5	25	5	25
Total		22	102	21	96	20	91	18	84	20	101
Selected Idea : Accessible and affordable Menstrual Products											

The selected idea from Table 1 was further refined by SCAMPER method as described earlier. The Table 2. shows the details of the SCAMPER activity followed during the ideation phase.

TABLE II
SCAMPER TECHNIQUE FOR REFINING THE IDEA

Substitute	Use of menstrual cups/ smart menstrual products.
Combine	• Partner with NGOs, governments, and educational institutions to provide comprehensive menstrual health education programs • Collaborate with local healthcare clinics
Adapt	Practice use of locally sourced menstrual products
Modify	Improve product design to enhance functionality such as reusable menstrual pads with adjustable sizes and moisture-wicking properties for better absorption.
Put into other use	Encourage the reuse of menstrual products
Eliminate	Eliminating unnecessary intermediaries, which can help lower the overall cost of menstrual products.
Rework	Establish community-based initiatives for better access accessibility and affordability.

Finally the prototyping was undertaken which included developing an informative, website for creating awareness about menstruation containing detailed text, photographs, comics, accessories associated to hygienic practice along with Frequently Asked Questions (FAQ) based on the responses to the questions was designed for the perusal of stakeholders involved. A tool-kit consisting of menstrual cup, low-cost sanitary pads, reusable clean cloth, tampons, menstrual cups & discs and period pants was framed. The elements of the tool-kit were demonstrated to the stakeholders regarding their usage, dos and don'ts, their pricing and sourcing.

CONCLUSION

The misbeliefs and taboos related to the menstruation were allayed and a sense of confidence to face the menstruation cycles was infused as part of the study. The study attempted to dispel the misbeliefs and taboos surrounding menstruation, fostering confidence among freshman engineering students. Utilizing the design thinking process for social innovation, the research identified, assessed feasibility, and implemented solutions to menstrual challenges, contributing to the students' contentment and preparing them for higher semesters by honing problem-solving skills and addressing social issues beyond traditional theory courses and labs.

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