Designing an Online Sex Education Resource for Gender-Diverse Youth

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ABSTRACT

Transgender and gender-diverse youth deserve proper sex education, but current educational and clinical structures largely ignore their developmental experiences. As a result, many of these teens go online to seek crucial information. Designers and researchers alike can benefit from an understanding of the design needs of gender-diverse youth for sex education online resources. We recruited 19 gender-diverse youth, ages 15 to 21, to participate in a mix of in-person and online design methods. This research makes three contributions; 1) identification of preferences for where gender-diverse teens prefer to get certain kinds of sexual health information, 2) design considerations for an online resource, 3a) a new method for eliciting preferences, the Four Corners Exercise, and 3b) a new method for combining the Asynchronous Remote Community (ARC) method with in-person sessions. Through this research, we provide key considerations in developing an online sex education resource for gender-diverse youth.

Author Keywords

Asynchronous Remote Community (ARC); gender-diverse youth; sex education; sexual health

CSS CONCEPTS

• Human-centered computing~Interaction design

* These authors contributed equally.

INTRODUCTION

Many students across the United States lack access to evidence-based sex education [5, 41]. Further, what is taught largely disregards the experiences of transgender (trans) and gender-diverse youth (hereafter collectively referred to as gender-diverse youth) [11]. Gender-diverse individuals have different needs than their cis-gender peers and have previously characterized school-based sex education as inadequate and, at times, harmful [22]. As a consequence of this lack of information, they are at higher risk of several negative health outcomes such as sexually transmitted infections (STIs) and experiencing violence in romantic and sexual relationships [9, 18, 34].

Building upon previous research on what information gender-diverse youth seek in sex education, we sought to understand the format in which these youth prefer to receive sexual health information and to understand design considerations for a potential online, gender-diverse specific sex education resource. In this study, we address the following research questions:

- *RQ1*: How do gender-diverse youth prefer to receive sex education-related information?
- *RQ2*: What role can design and technology play in developing effective sex education resources for gender-diverse youth?
- *RQ3*: How can we adapt current participatory design methods to gain insight into difficult-to-discuss topics like sexual health?

To address these questions, we engaged with 19 gender-diverse youth in two focus groups, a three-week Asynchronous Remote Community (ARC) study, and a final co-design session to understand design requirements of an online sex education resource. Our research makes three contributions:

1. Identification of preferences for how gender-diverse youth would like to receive different sexual health-related information,
2. Empirical findings for design needs for an online sex education resource for gender-diverse youth, and

3. Novel methodological approaches that can be used to explore sensitive topics with teens, including a) a new "Four Corners" design exercise that builds on the line judging method [43], and b) combining in-person focus groups with an online ARC study.

BACKGROUND AND RELATED WORK

Sexual Health Needs of Gender-Diverse Youth

Gender-diverse youth — people ages 12 to 21 years old whose gender and/or expression does not align with their assigned sex at birth — have unique sexual health needs [31]. As others have noted, sexual health for gender-diverse youth is more than just sexual behavior; it encompasses internal and social dynamics such as challenges with body image, sexual anatomy, gender dysphoria, disclosing gender to a partner, and communicating with a sexual and/or romantic partner [31].

Despite the clear need for tailored, gender-affirming sex education resources for gender-diverse youth, only a few studies have explored the specific sexual health requirements of this group. In a 2019 study, Haley et al. revealed two key insights in regard to what sexual health information gender-diverse youth look for and where they get such knowledge [22]. First, they report that trans and non-binary youth commonly receive sexual health information from their schools, healthcare providers, peers, romantic partners, and online sources, but the first two sources are limited due to irrelevant curriculum and varying quality of interactions with providers (including experiences that can be ignorant or even harmful). Second, they surfaced eight sexual health content needs described by gender-diverse youth: puberty-related gender dysphoria, non-medical gender-affirming interventions, medical gender-affirming interventions, consent and relationships, sex and desire, sexually transmitted infection prevention, fertility and contraception, and healthcare access.

To understand the changes happening in their bodies and how to navigate developing sexualities and their social implications, many gender-diverse teens go online to find information [16, 37]. While some online resources can provide relevant information, many are often unvalidated, unmoderated, and some also spread misinformation [22]. Online spaces are also useful testing grounds for many gender-diverse youth, allowing them to explore their identities, seek information, and connect with others [13, 16, 17, 30, 38]. Given research demonstrating that gender-diverse youth tend to use online spaces as resources, there is ample opportunity to identify the design needs of such technologies and specific ways gender-diverse youth can digitally engage with sexual health topics.

Designing for and with Youth

Research with youth presents a unique set of challenges, such as access barriers and communication struggles, but focus groups have proven to be one method for effectively engaging with adolescents because they work to rebalance power

dynamics, among other reasons [33]. As a result, Interaction Design for Children (IDC) research has taken up participatory and co-design methods (e.g., [29, 32]), with some researchers developing and adapting their own techniques. For example, Walsh et al. introduced Line Judging in which participants position themselves on a line drawn on the ground to reflect their positive or negative preferences for an idea or topic [43]. Line Judging allows participants to express opinions on a spectrum, spatially visualize their choices, and explain to researchers their rationale for choosing their positions. Additionally, Guha et al. presented the Mixing Ideas method for collaborative brainstorming [19]. Mixing Ideas occurs in three stages: individual idea generation, sharing ideas in a small group, and sharing ideas with the whole group. This breakup into three steps helped individual participants express and share their ideas more freely.

These methods have been instrumental in developing insights into a wide array of topics such as identity formation [10] and cyberbullying interventions [3]. Researchers have also used participatory design methods to engage with marginalized youth such as immigrant teens [14], Syrian refugee youth [15], and Latina teens [42]. Participatory design methods are particularly impactful for the ways they enrich the work and give youth a sense of belonging and empowerment through their participation [35]. These methods have proven useful in engaging with marginalized youth because they highlight voices and perspectives typically left out of research [28]. However, there is a large gap in addressing design needs for gender-diverse youth both in IDC and Human-Computer Interaction more broadly; at the time of this study, there were no studies focusing on trans or gender-diverse youth in the ACM Digital Library.

For studying people who are difficult to access, the Asynchronous Remote Communities (ARC) method is useful for studying and bringing together participants who might normally be separated by large geographical distances and might struggle to find community in their immediate areas, such as people with rare diseases [26] and people living with HIV [27]. ARC is well-suited to studying adolescents: given their preference for online interventions, it also makes sense to incorporate such preferences into research methods [33]. From the IDC community, Bhattacharya et al. used the ARC method to engage teens in designing new stress management tools [4].

Policies for Gender-Diverse Youth

Within the US, there has been overall support for comprehensive sex education in schools, yet a 2016 report showed that only 38% of schools covered 19 critical sex education topics set by the Centers for Disease Control and Prevention [8]. While conversations about the state of sex education in the US have historically forgotten about gender-diverse youth, signs of change have begun to emerge. For instance, Healthy People 2020 Adolescent Health's AH-9 specifically addresses sexual orientation and/or gender identity-based harassment [39].

Policy is an important consideration alongside practice and design [25]. Policies, both governmental and private, can have tremendous influence on groups, such as gender-diverse people, who face systematic prejudice. For example, several states have introduced bills restricting public school participation in interscholastic athletic events at which athletes of different biological genders are allowed to participate in competition against each other, unless the event specifically includes both biological genders [2]. Such policies can limit the participation of and opportunities for trans youth in athletics, and they also further normalize discrimination.

In addition to government policies, platform policies can also result in promoting health of gender-diverse individuals and discrimination. For example, Haimson et al. described Tumblr as a "trans technology" for the ways it allowed community building among trans users and information sharing. However, new policies in December 2018 banned "adult" content, which ended up erasing much trans-related content, thus removing an important resource for its trans users [21]. Policy implementations—whether they are governmental or from platforms—the everyday experiences of gender-diverse youth, and designs must be considered alongside the policies that shape their use.

METHODS

Recruitment
We employed maximum variation purposive sampling [12] with the goal of recruiting a diverse sample with a wide variety of gender identities across the transgender and gender-diverse spectrum. Participants were recruited from Seattle Children's Gender Clinic and three community-based organizations in the Greater Seattle area that serve local gender-diverse youth. The community organizations assisted the study team with recruitment by providing study information to youth, referring interested youth, or allowing research team staff to recruit directly during existing support groups and events.

Participants
A total of 19 youth participated in at least one session who ranged from 15 to 21 years old (M=17, stdev=2). Similar a study by Ahrens et al., we included both current adolescents and young adults who are just beyond adolescence to allow for reflection on both concurrent and more retrospective effects of design considerations [1]. Because of this age range, we hereafter refer to participants as youth. Of the participants, 5 identified as transgender female, 9 as transgender male, 5 as non-binary, 2 as gender fluid, 5 as male, 2 as female, and 1 as agender (the total exceeds 19 because some participants have more than one gender identity). Our demographics survey mistakenly conflated gender and sex and should have allowed participants to identify with a gender rather than a sex (e.g., trans woman instead of trans female).

Initial Focus Groups
During the first phase of the research study, members of the research team facilitated two initial focus groups (n=7 and n=12). Each focus group lasted approximately two hours. The study team obtained written consent prior to each focus group and youth were asked to complete a brief survey consisting of questions about demographics and their current sources for sexual health information. After reviewing the objective of the research study, the study team used a semi-structured focus group script to facilitate discussion around the youths' conceptions of sexual health and how they access sexual health information. Please see Appendix A for the full protocol and prompts. The focus group sessions were video recorded with participant consent.

Following the semi-structured interview script, we employed a new participatory design technique called the Four Corners Exercise, which builds upon the line judging technique [43]. Four Corners adds an additional dimension to Line Judging as well as allows participants to make different kinds of decisions (i.e., preferences among choices rather than positive versus negative reactions). Also similar to Line Judging, Four Corners generates insight into the youth's preferences as they shared their reasoning for choosing a specific position and, if relevant, why they chose to move.

In this exercise, researchers labeled each corner of the room with different modes of receiving sexual health information: in-person, written, question and answer (Q&A), and videos, with the understanding that aspects of these formats may overlap or co-exist. These formats or methods of delivering sexual health information were decided upon by the research team prior to the focus groups based on an extensive exploration of existing sexual health resources and prior qualitative work [22]. We defined each category as follows: written (information that is read, online articles or fact sheets, pamphlets, or written articles or factsheets), in-person (1-on-1 interaction, doctor or provider visit, talking with partner, teacher presenting curriculum, or phone hotline), Q&A (text chat, FAQ format curated by resource creator or doctor, ask-me-anything format, panel with experts or lived gender-diverse experience), and video (YouTube, other video platforms, videos embedded in articles, or film/TV). Participants were also instructed that they could remain in the middle of the room if they felt that none of the corners represented their format preference.

The research team generated a list of content area requirements based on a prior qualitative study with gender-diverse youth [22]. The topic areas included: 1) STI prevention, 2) fertility and contraception, 3) puberty and dysphoria, 4) sex and desire, 5) relationships (consent, boundaries, and disclosure). In the first focus group, we asked the youth to place themselves in a position in relation to the four formats that reflected their preferences for receiving information on each sexual health-related topic. In the second group, we iterated on our protocol by providing a hypothetical scenario for each

sexual health topic and asked that they place themselves in response to that scenario to better help ground the discussion around sexual health.

The Four Corners exercise provided a way for the youth to express multiple preferences; for instance, some went directly to a particular corner while others positioned themselves in between two or more corners. Additionally, once all youth had chosen a spot to reflect their preferences, we asked each person to explain their reasoning. Why did they choose this particular spot? As each individual gave their opinion, some of the others would move too. The Four Corners exercise allowed the research team insight into rationale for the youth's preferences not only from their initial positions in the room but also from where and why they moved. The youth's positions were documented after discussion and we formed "heat maps" indicative of participant preferences. Heat maps were then summarized and converted into Table 1. Focus groups were video-recorded, and notes were taken during the focus group sessions by study personnel.

ARC Prompts
Focus group participants were offered the option to participate in a follow-up Asynchronous Remote Communities (ARC) group on Discord (https://discordapp.com) for 1 month following the focus groups. Previous ARC studies have used Facebook [26] and Slack [4], but we used Discord because it similarly allows for communication in private online channels and because of its popularity among this age group and among gender-diverse youth. We set up separate "servers" for each focus group, and there were 6 youth in the first group and 10 in the second. We asked participants to work on a weekly activity for three weeks, and we estimated each would take 20 minutes to finish. Participants were given $10 per weekly activity.

We designed a mix of divergent and convergent thinking prompts to either generate new ideas or choose and refine existing ideas respectively. Convergent and divergent thinking strategies are both necessary for creative thinking and for socially meaningful solutions [44], and thus we included activities that worked both forms. Appendix A includes further details about each activity. The three activities were:

1. Posting drawings or descriptions of their ideal sexual health resources, with or without the use of technology (divergent thinking prompt),
2. Evaluating three existing sexual health or health resources chosen by the study team because of their representation of a variety of formats and designs: Transgender Teen Survival Guide Tumblr, the Clue Sex Blog, and they2ze (convergent thinking prompt), and
3. Designing their ideas for a technology-based sexual health resource (prompts included both divergent and convergent thinking components).

Co-Design Session
Approximately 6 weeks after the final ARC group concluded, the authors met with 4 participants who had also been involved with the focus groups and ARC study for an in-person co-design session of an online sexual health platform. All previous focus group participants were invited, but we sought a smaller group, and thus the design session was held once we had a sufficient number of participants, representing a diversity of gender identities, enrolled. The co-design session was video recorded with participant consent. Using the Mixing Ideas method [19], participants first sketched wireframes individually. Afterward, they paired up to share their sketches and ideas and develop a joint design together. Finally, each pair worked together, shared their designs, and created a final prototype. The goal of this co-design session was to a) create wireframes of an online sexual health resource for gender-diverse youth and b) understand design rationale for each component of their resources. Appendix B presents wireframes from our co-design session.

Data Analysis
We conducted a thematic analysis [7] of transcribed video data from the focus groups and co-design session, the text and design data pulled from the Discord groups, and the wireframes created in the co-design session. To build on focus group results during the ARC, we accelerated focus group analysis by using a modified transcription process. Two members of the research team noted key themes from each 5-minute increment in the group videos. They transcribed quotes around key discussion points (such as the summary of a discussion around preferred format for a specific content area) on a templated note-taking document and discussed when disagreements occurred. An initial codebook of themes was created a priori based on the key goals of the study. Three authors reviewed and coded the focus group transcripts and ARC postings for key themes, iterating on codes and resolving disagreements via discussion. We developed codes generally around format, content, and design preferences. Finally, two investigators re-read all notes, code summaries, and primary data sources and re-summarized main themes in memo form. We compared all memos generated to iterate upon emergent themes.

The research team confirmed themes and analysis of their data with the participants throughout the study, once during the ARC portion and again during the co-design session. At those points, the research team generated and presented interim summaries of participant ideas and requirements and asked participants for feedback and clarifications. This allowed us to ensure that we were not misinterpreting data and helped ground our analysis.

Ethical Considerations
The research team prioritized creating a gender-affirming, safe environment. Study staff used youth's chosen names (as opposed to legal names) and their pronouns. Focus groups were conducted in a private room where many participants

attended support groups for gender-diverse youth. Due to the vulnerable nature of this population, we created protocols in the event that a youth expressed emotional distress or thoughts of harm to self or others. For full protocol for disclosure of self-harm, please see Appendix C. The research team moderated ARC discussion threads and encouraged the youth to create anonymous usernames that protected their privacy. At least one member of the research team monitored online discussions daily for concerns of safety or emotional distress, though no such posts occurred. To protect privacy, the research team pulled data from each Discord group, anonymized content, then deleted each server at the conclusion of the study. Finally, all sessions and protocols were approved by Seattle Children's Institutional Review Board.

RESULTS

In this section, we present themes in three main categories: 1) preferred formats and sources, 2) design needs of gender-diverse youth, and 3) other considerations beyond sexual health.

Preferred Formats and Sources

Preferred formats for receiving information varied by the type of information. For each previously identified content area, we tracked the relative preferences for the four format options given in the Four Corners exercise (see Table 1). If a participant finished the exercise between two or more categories, they were counted as preferring both categories. If a participant expressed that multiple formats would be acceptable but did not identify specific preferences, they were placed in the indeterminate/middle category. In Table 1, we note that although contraception and fertility were combined when we presented the topics, participants tended to describe preferring written basic information on contraception and in person for discussions about fertility. Additionally, if a participant described multiple preferred formats for a specific content area, they were counted in all preferred categories (i.e., categories are not mutually exclusive). If a participant expressed that multiple formats would be acceptable but did not indicate specific preferences, or did not describe a specific preference, they were placed in the indeterminate/middle category.

Participants expressed that their format preferences depended on the type of information they were seeking. They highlighted three themes of information types: 1) universal, fact-based sexual health content (i.e., information about STIs and contraception) and 2) content that requires personalization to an individual's specific gender and/or medical transition, and 3) relational topics (e.g., consent, disclosure of gender). Additionally, the source of information is also an important consideration regardless of format.

Fact-Based Sexual Health Information

The majority of participants preferred a written format for receiving universal, fact-based information on STIs or contraception. Participants expressed that written formats, including print and online text, are useful for having an initial base of knowledge they could refer back to at any time. Some participants also said written information allowed for discrete access to information, which was helpful to avoid social anxiety. One participant from Focus Group 2 expressed: *"I think written information is really good [...] because it eliminates a lot of the shame because it's hard to get up and find someone and be like, hey, can I just talk to you about a sex question? And it's also something you have access to if it's online, at all times. It's really useful."* Further, no consistent preference was expressed for paper versus online written information or vice versa.

Some participants expressed the value of receiving information via an in-person interaction, particularly with medical providers. In Focus Group 1, one perceived benefit of having an in-person discussion with providers that emerged was the idea that STI testing or contraception could be immediately integrated into the visit if desired by the participant. Other participants expressed that having in-person conversations could be de-stigmatizing. Another youth said they would prefer the online Q&A format for STI and contraception information because it would allow them to gather multiple perspectives and build an online social community.

Some participants expressed reservations about in-person or Q&A formats. Reasons given included social anxiety, a lack of anonymity, and potential for stigmatizing responses if a

	Written Material	Q&A	In-Person	Video	Indeterminate/ Middle
Sexually Transmitted Infections	11	5	5	0	2
Contraception and Fertility	6	3	8	4	4
Sex and Desire	5	1	11	3	5
Puberty and Dysphoria	1	5	8	4	5
Consent, Disclosure, and Other Relationship Topics	3	6	9	6	2

Table 1. Final Format Preferences Based on the Four Corners Exercise

provider or facilitator responded in a non-affirming way. An additional concern related to Q&A format was that, without moderation by experts, answers could potentially be posted by sources that did not have accurate information or were speaking only from anecdotal experience.

Finally, after a discussion about the relative merits of each of these formats, participants in both focus groups reached a consensus that a combination of formats might increase accessibility for youth. Specifically, youth most often suggested a combination of written with in-person or Q&A, as this would facilitate reading the information beforehand and/or referring back to it easily afterwards. A participant from Focus Group 1 stated, *"birth control is such a specific thing that eventually you will need to talk to your doctor, but written [information] is a good place to start."* Adding to this, a participant during Focus Group 2 expressed: *"if I had a conversation in person…and they give a whole bunch of different information and I remember very little or none of it. But if I had it written down then it is like, this is the thing…does that make sense?"* Another participant from Focus Group 2 explained their split decision and placement during the Four Corners Exercise: *"I'm mostly standing down the center because…I know a lot of people who only tend to retain memory through writing and people who retain through experience."*

Sexual Health Topics Requiring Personalized Information
Participant preferences changed when it came to sexual health topics that called for information to be more personalized to each individual's experience or transition. For these content areas, youth in this study preferred in-person, Q&A, and, to a lesser extent, video formats over written information. Some participants again recommended offering the information in multiple or integrated formats to accommodate those with different learning styles, social anxiety, or those who were not yet ready to come out.

When discussing specific STI treatments or contraception options, many participants preferred in-person or interactive discussions, as they felt that this method afforded them the ability to receive information tailored to their specific needs, gender, medications/treatments, and/or behaviors in which they were engaging. Some preferred to get information in-person specifically from a gender-affirming provider or via an interactive Q&A format moderated by an expert because it would allow them to pose personalized questions that could not be included in a written article or fact sheet. As a participant wrote during the ARC, *"I think everyone can see the benefit of having this information literally coming out of a certified person's mouth. Specifically, someone who may or may be a doctor/nurse but who is trained in medicine when it comes to preconception along with birth control and menstruation."*

Similarly, when learning about the effects of gender-affirming treatments on fertility, sex, desire, and dysphoria, partic-

ipants emphasized in-person or Q&A formats for personalizing information to a person's specific needs, particularly with regard to effects of hormone therapy. As one participant from Focus Group 2 stated, *"everyone's puberty is different and everybody's transition is different so that's why Q&A can be helpful."* Similarly, another participant from Focus Group 1 said, *"when you start hormones, you're kind of going through that 2nd puberty…there's a lot of stuff online, generally puberty is different from person to person and it can't really be generalized…it's not something everyone can feel the same about, especially with dysphoria."*

Relationship-Oriented Topics
When approaching relational topics such as navigating consent with a partner, setting and maintaining boundaries with partners, and deciding when and how to disclose transgender and/or gender-diverse status to a prospective partner, participants expressed a desire for formats that provided youth with scripting for how to handle fluid situations, allowing them to observe body language, facial expressions, tone of voice, and specific language. Thus, participants primarily preferred both in-person and video formats for these topics. A participant from Focus Group 1 weighed the pros and cons of in-person versus videos: *"Doing stuff in person always prevents misunderstandings, which I've had my fair share of, and it's definitely a lot easier to get your point across. But also videos are really good for learning how to go about bringing up the topic, whether you are asking someone about their identity or coming out about your own identity."* Another participant from Focus Group 1 debated the same question: *"With videos when you see someone talking about their own experiences you can see more how they feel… you can relate more and it also emphasizes the importance when they talk about stuff that they've experienced."*

Preferences for Information Sources
In considering the source of fact-based information, participants almost universally stated that they preferred that content be developed by a medical provider with experience in gender affirming care. One youth from the second ARC group wrote about the limitations of Q&A or the lived experience: *"For the most part, I am all in support of the 'made by trans people, for trans people' idea. But I think some of this information would also be helpful if it came directly, not only from a trans person, but perhaps a therapist or a doctor who have worked with trans people and their experiences."*

Similar to general, fact-based information, participants tended to prefer to receive personalized information from a medical provider with expertise in gender care and knowledge of their specific treatments and desired treatment outcomes. One participant from Focus Group 1 elaborated: *"having in-person a doctor saying 'this is completely normal,' things like that because some people don't know how to relieve all of their sexual tension because as a trans person it's kind of hard to do that when you don't have all the resources to learn about how to do that."* Video or written

materials were seen as beneficial by a minority of participants for tailored information. One participant from Focus Group 2 described receiving detailed written information at a conference for gender diverse people and said that that *"written material helped me understand that there are ways I can fix how I'm feeling, and there are ways that I can feel better about, and I've been pretty happy since then."* However, it was also described by some as impersonal and potentially harmful to those who may be undergoing transitions or journeys that do not fit what static materials might describe.

For relational topics, there was an emphasis by youth on the lived experience: participants expressed a desire for content to be created by transgender and/or gender-diverse people. As a participant from the first ARC group noted, *"I think it might be good to show (in addition to the info regarding sex, std, puberty, etc.) LGBTQ+ video creators. Many who do content that I've watched go into some part of their stories on the info mentioned."*

In design practice, participants discussed how clarity of an information's source is important, and they shared that they view citations, author profiles, date published, and links to external resources to establish credibility. While reviewing an existing resource, one participant in the co-design session appreciated the sources: *"the citations support their reliability and accuracy."* Another participant from Focus Group 2 conveyed that *"when you don't get information from a really trustworthy source it can be really easy to believe something for many years that turns out to be absolutely not true…false information…a lot, a lot of misinformation."*

Design Needs of Gender Diverse Youth

Discreet and Non-Triggering
While many of the youth recognized the value in having a trans-specific information resource, they also emphasized the importance that it be discreet over concerns that it might out someone if accessed publicly. Many focused on the logo and landing pages in particular. For instance, a participant from the co-design session suggested a more generic logo rather than one displaying a logo or symbol associated with the transgender community. Another co-design participant suggested a logo that could be recognizable within the community, but not obvious to others. They pointed out that the use of male/female symbols and colors from the trans flag (white, pink, and blue) could immediately out a person. The co-design participants agreed that whatever color the trans-friendly resource used, that it should not immediately be obvious that it is meant for trans users yet is easily identifiable by community members.

Many participants advocated for the use of visuals for an online sex education resource but warned that some content might be triggering to some users. Participants discussed the importance of presenting non-triggering information and vis-

uals as a part of an online sex education resource. Some participants debated the use of cartoon images for things like anatomy, as some sex educational resources have used, versus real ones. They suggested two possible features for this: hideability of visuals and blacklisting of topics. In the first Discord group, a participant wrote *"on the actual website, I think there should be some pictures, but that are not actively visible to prevent discomfort (i.e., a picture of a uterus)."* From the same group, one wrote *"I'd like more emphasis on images too, but the images should be hidden under a 'spoiler' system. This is to prevent triggering."* In our co-design session, a participant introduced a feature where visual content would be hidden by default, obscuring potentially triggering visual content where the person could click to show or hide content.

Participants came to a general consensus around the ability to blacklist or mute tags (i.e., controlling what content they see). In the co-design session, one participant designed the blacklisting feature, pointing out that articles and resources on the site should have tags that described the larger topics covered, which would make it easier to find relevant information and, crucially, obscure anything that might be triggering to a person. A participant from the second Discord group wrote *"[I]'d really like that idea to feature blacklisted informational tags as well, assuming there's an account registration alongside this feature to also save worthwhile articles. basically, to hit all bases in removing and avoiding certain topics as much as it helps search and gather information."* Some participants also asked for an additional feature that involved personalizing the resource through quizzes. The co-design session participants voiced a need for a *"triggers quiz & types of info interested in to tailor results"* or a *"short quiz or bio to filter out triggering information."*

The Importance of Incorporating Lived Experience
Participants emphasized the importance of both incorporating lived experience perspectives that represented different viewpoints, and of making it prominent on the website that content was at least partially written by gender-diverse persons. For instance, one participant from the first Discord group said, *"I think it's really important to have multiple experiences shared by non-binary people, especially of all ages. I feel like society has been telling non-binary people that their identities are just phases, so they don't really have an idea of what they will look like when they're older. It's a wise idea to have an older non-binary person who can say, 'Hey, I did it. And I'm still non-binary.'"* From the same session, another mentioned that people who might engage in hormone therapy might start it at different times, thus making second puberty difficult to generalize. Additionally, a participant from the second Discord group talked about how *"it's useful to have resources sorted by if they are more aimed at transfem people vs transmasc people, because it can help with people who don't know what terms mean."*

Building Credibility through Security and Relevance

Many youths wished for a sex education resource to be professional, which carried a range of definitions. For some, a professional site meant that it was credible and certain information was linked to trustworthy sources (e.g., medical journals). Participants from Focus Group 1 also expressed the difficulty of assessing whether information they came across online was credible or not. Some participants referenced sites created by TERFs (Trans Exclusionary Radical Feminists) that initially come across as well-intentioned but, after closer review, actually spread misinformation and harmfully encouraged dysphoria.

Data privacy and security was another significant theme that participants brought up in considering an online sex education resource. As one participant from the second Discord group wrote, *"[l]egally, confidentiality should be the topmost priority for a sensitive topic such as sexual health."* Some thought it was important for such a resource to be transparent about who is publishing the resource, whether cookies are being used, and how data are tracked (or not tracked). Many participants strongly suggested that their ideal resource would not track their data.

Relatedly, there were discussions around how to integrate a safe and secure, yet optional, log-in system. As some co-design participants discussed, logins could allow for personalized trigger warnings, as mentioned in the non-triggering section, and for saving articles to reference later. However, others pointed out that accessing information while using an account also could mean that their data might be tracked. Youth also noted that accounts and logins could be anonymous (usernames or auto-generated, such as a number and a color) and that people should not be forced to use their real names.

To improve relevance, participants highlighted the need for orientation towards local resources, and this theme was particularly salient when participants during the ARC were asked to review existing resources. From the second Discord group, one youth pointed out *"I'd also like to be able to specify search by network (like if I want to stay within the Seattle Children's Clinic as much as possible, I can contain my search results to there first) or within a zip code or city limit."* Another from the same server wrote, *"I think having a mobile app serving as a link between youth and provider is an innovative and reliable technique. with more and more gender-diverse youth scouring the internet for answers safe places, where else would be a better resource than the one sitting in your pocket? it feels like a google maps for the transgender community, and that's really comforting."* In the co-design session, participants highlighted the inclusion of *"location-based info"* and even drew out a map that would display local medical teams, doctors, and other resources.

A few participants made it clear that having poorly updated information about local resources would be worse than having no local resources section. For example, They2ze, a youth-designed app with a database of health and life resources vetted by the trans community, drew criticism for not being updated, as one participant wrote *"they2ze has so much potential, it is unbearably disappointing that the last time it was updated was two years ago."*

Other Considerations Beyond Sexual Health

Although activities focused on sexual health, participants consistently brought up several related themes. First, they talked about other aspects pertaining to their health, such as their hormone levels, side effects, expected pace of physical changes, interactions with birth control and other medications, and mental health resources. For instance, a participant from the first Discord group wrote, *"I feel a scientific and medical help section would be great and help people understand the health side of being trans."*

Several participants also described non-sexual/reproductive health situations in which they had to deal with coming out and/or answering questions about their gender. A participant from Focus Group 1 expressed: *"I go to the same school I've gone to my entire life, so for the most part I don't have to deal with [coming out]. But also, when I get out and I'm 'stealth' I feel like I'm alive for the first time, but then I don't want to tell anyone anything so I'm terrified. I'm living but I am terrified."* Additionally, participants emphasized that basic information, such as etiquette for how to treat a trans person with respect, needed to be taught to everyone regardless of gender identity to reduce stigma and dysphoria.

Our design sessions also surfaced aspects of designing for better sexual health distinct from technological solutions. Particularly, the participants called for a redesign of sexual health curriculum to include gender-diverse topics. When discussing their own experiences with sex education in formal, American educational settings, participants revealed several failings. For instance, curriculum might treat sexual health as a taboo subject by either excluding the topic altogether or shallowly covering it. As one Focus Group 2 participant expressed: *"My school has history of treating gender in sex education like poison oak, you will touch it and then never touch it again."* A youth from Focus Group 1 called out that *"schools have created ignorance around trans people by not talking about their issues; there should be education for everyone on trans issues and trans etiquette."* Neglecting these topics can have adverse developmental effects. One participant from Focus Group 1 shared that they transitioned later than they preferred to because information on their identity was not available through their sex education.

Reflection on Method

Although combining in-person methods with the ARC is counter-intuitive for an ARC and not possible in many cases, we found there were benefits to doing so. For example, after our second focus group concluded, many participants had congregated to one corner of the room next to the table of food. We were pleasantly surprised to find that they were sharing

their Discord usernames and connecting with each other online without having been prompted to do so. One exclaimed that they had never been in a room of other trans and gender-diverse youth before. The Discord server consisting of participants from the second focus group had many interactions. Participants built on each other's ideas and had debates, appearing to have established trust and rapport perhaps in part due to the connections they made from meeting in-person. However, we did not conduct a network analysis, nor did we interview participants to reflect on our methods, so we cannot make definitive claims about the effect of this combination.

The Four Corners Exercise that we introduced is just a slight modification to Walsh et al.'s line judging technique [43], but adding an additional dimension for participants to choose from led to added insight into the nuances of their preferences. Having an expanded range of options allowed the research team to identify the situational nature of the questions we were posing, as outlined in our findings. Additionally, the process of having each youth share their rationale for their placement, then watching others move based on this reasoning and in turn express why they moved, generated valuable feedback.

DISCUSSION
Our results inform design choices about the formats and sources for sex education resources for gender-diverse youth (RQ1), as well as the role of design and technology in the creation of those resources (RQ2). While our research focused on design, the results also point to policy implications of equal importance to those for design, and we discuss those as well. Finally, our results inform future research, particularly participatory research addressing difficult-to-discuss topics like sexual health (RQ3).

Implications for Design of Sex education Resources for Gender-Diverse Youth
Designers of a sex education resource for trans and gender diverse youth should consider 1) which formats and sources to present information and 2) two themes that cut across the design needs described above, considering safety and the range of gender-diverse experiences.

The participants of our study preferred certain formats based on the nature of a specific sexual health topic. They favored written content or reference materials from a credible source for fact-based information and interactive and/or multimedia approaches for more relational content. Thus, a hybrid of in-person and online content may be the best strategy for designing resources to serve gender-diverse youth as they navigate a multiplicity of experiences. Additionally, bringing together interactive, online Q&A with either a gender specialist provider or person with lived experience with written and video resources might allow for broader reach to more disenfranchised youth. This would help reach those who would not normally have access to in-person sex education resources due to a lack of parental support, logistical or geographic limitations, or access to gender-specific care [17].

Finally, sexual health information is intimately linked with other aspects of the gender-diverse experience, thus effective sex education resources will likely include content addressing other aspects of trans health, such as transition, hormones, or pubertal blockers. This may also increase the appeal of the resource to gender-diverse individuals, as well as make it less stigmatizing or embarrassing to access content.

Our results suggest that technology can play an important role in the sex education of gender-diverse youth, including both physical and social development. An online resource has the potential to provide important information that may help individuals form their identities faster or seek help when necessary. However, designers of such an online tool should consider two design implications salient across the design needs raised in our findings: designing for safety and designing for inclusion.

Considering safety should involve protecting youths from emotional distress by avoiding triggering dysphoria and from others who might try to harm them by not outing users to the public and securing their data. Youth in this study created ways to account for each such as blacklisting and toggling hideability features, employing discreet design, and non-mandatory login capabilities. The option to have privacy and anonymity and the ability to block out dysphoria-producing content is paramount for this group; if resources are not designed with care, they could inadvertently contribute to dysphoria or stigma for this population. More recently, researchers have emphasized safety for online gender-diverse users as a design priority [20]. Scheuerman et al. called for technology designers to attend to subtle forms of violence perpetrated online in addition to prominent ones [36]. In addition to Scheuerman et al.'s "insider harm" [36], or harm from within an individual's social networks, designers should also consider harms that are experienced internally such as dysphoria, triggering content, or social comparison. In regard to data privacy, some have offered solutions such as allowed internet users under 18 to opt-in to data tracking and stronger mechanisms to erase youth's personal information [40]. In our extension of these ideas, we also draw from Pinter et al.'s call for giving youth more agency in their data privacy and security. We recommend that technology designers consider this by being transparent about their privacy policies and letting youth choose what happens with their data.

Designers should also account for the range in developmental and social experiences of gender-diverse youth. Designing for inclusion requires designers to recognize that even within the category of gender-diverse youth, individuals encounter very different experiences on very different timelines. For instance, two youths of the same age may respond to hormone therapy differently or may take different doses or combinations of medications. Accounting for such variety is not an easy task, but it is important not to frame any one experience as a norm to avoid unnecessary and potentially

harmful comparisons. Additionally, designers should consider that potential users may also have a spectrum of access to resources. An online tool can help extend access to care, but it is crucial that such a resource does not solely center the urban experience [23]. Finally, if technology designers provide local resources for their users, it is crucial to regularly update such a database so that it is relevant and usable. As participants' reactions to they2ze demonstrate, it may be better to have no resource than an outdated one.

Implications for Policy

IDC researchers are faced with the difficult challenge of bringing youth online while also protecting them from potential danger. As such, IDC research needs to continue to expand its understanding of how we can shape future policy. Examining how policy and design are entangled is especially important in the context of this study, because online resources will have limited utility if current education policies prevent them from reaching the youths who need their content most. Therefore, technology designers cannot take on this problem space alone; they must advocate for policy that guarantees access to education content and resources for all youth.

Youths in this study highlighted structural changes that technology design cannot accomplish on its own. In conceptualizing an ideal sex education resource, many brainstormed solutions beyond artifact design and emphasized that education cannot ignore the experiences of gender-diverse youth. Several in this study asked for inclusion of content about gender-diversity in sex education curricula for *all youth* as well as a way to address discrimination and ignorance. Policymakers should consider how to incorporate content that covers gender-diverse experiences (i.e., definitions, basic etiquette for addressing a person who identifies as transgender, non-binary, or elsewhere on the gender diversity spectrum) into curriculum. Curricula should also take advantage of multiple modes of conveying certain kinds of information. In addition to school policy, we highlight participants' concerns over data privacy to push policymakers to modernize their conceptions of data (e.g., personal health data from wearables) and how to more effectively protect them. Finally, we challenge social media platforms to reconsider what counts as "adult" content when choosing what to ban. Algorithms need to be refined so that they do not alienate gender-diverse users and the educational experience that their platforms can provide. Likewise, schools may need to consider whether content filters in place on school computers may inadvertently exclude youths from accessing necessary health content.

Implications for Research

Being able to collaborate with gender-diverse youths on a resource for gender-diverse youths was a valuable and rewarding opportunity, and so we reflect on the benefits and limitations of our methods and possible future directions. Participatory design proved effective for engaging with this group. As previous scholars have detailed, participatory design can help youth analyze and enact their identities through design

[10] and surface and address systemic change [6]. Booker and Goldman additionally note that participatory design research is strengthened in the ways it allows for open dialogue and challenges traditional researcher/participant roles and who counts as learners versus who counts as an authority [6]. Our approach in this study embraced these principles as we made clear that the learning process and space was one that was co-created by researchers and participants alike. Doing so allowed for honest dialogues about traditionally difficult-to-discuss topics like sex education, sexual health, and their respective lived experiences. Previous research to understand how youth cope with and talk about other difficult and sometimes vulnerable experiences has yielded similar results. For example, Hong et al. also explored the need for an outlet to discuss a sensitive topic like managing a complex chronic illness as an adolescent [24], and we extend their findings by providing additional methods.

This study identifies individual support through the use of an online resource, and so future work might consider examining how to integrate social support into sex education. Additionally, other work might consider how to provide sex education through multiple channels, rather than through a singular, gender-diverse-specific resource. Next, this study is rooted in Western, hegemonic views of what it means to be transgender and/or gender-diverse, and we note that our findings merely represent a part of the trans experience. The participants of our study tended to consist of youth located close to urban areas with access to gender-affirming care or support, making our results difficult to transfer to all gender diverse youth. Finally, the size of our samples in each part of the study and the age range of participants might have concealed more specific needs than those surfaced in this study.

CONCLUSION

Trans and gender diverse youths deserve access to thorough and affirming sex education. Given the absence of sex education that encompasses the gender-diverse experience, the online world has great potential in providing support to many gender-diverse youth. We imagine our results inspiring the creation of an ecosystem of integrated resources, with coherent links among them, that are designed for privacy, safety, and inclusion. Designing such resources will not be enough, however, so we also discuss policy needs to promote access to those resources and gender-inclusive sex education. We also hope that researchers working with marginalized youth or studying difficult topics can benefit from our description of the Four Corners Exercise and our successes combining in-person focus groups with an ARC study.

APPENDICES

All supplementary materials for this study are available at https://doi.org/10.5281/zenodo.3755883.

SELECTION AND PARTICIPATION OF CHILDREN

The research team recruited through two channels: 1) community-based organizations that support gender-diverse youth and their families and 2) patients from Seattle Children's Gender Clinic. Study staff conducted a consent conference with each youth individually by phone, emphasizing the voluntary nature of the study and disclosing the most sensitive topics. All youth were given the assent/consent form. Because it is common for trans youth to be estranged from their legal guardians and/or seeking parental permission could potentially endanger them, we obtained a waiver of parental permission from Seattle Children's IRB for all participants. Youth were compensated for each activity they elected to participate in ($30/focus group, $10/week for 3 weeks of ARC, $30 for co-design group).

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