Design preferences for global scale: A mixed-methods study of “glocalization” of an animated, video-based health communication intervention.

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Abstract

Background

Designing health communication interventions for global scaling reinforces health literacy promotion and facilitates time-sensitive global health messaging. Limited literature explores preferences for animation prototypes and other content characteristics across participants living in different global regions. Prior research underscores an urgent need for health communication interventions that are more compelling and accessible across diverse global cultures. This study provides valuable international insights and key considerations for health communicators and educators developing video-based, animated content intended for global distribution.

Methods

We used a mixed-methods, sequential explanatory design, drawing on participation via an international group of learners enrolled in a massive open online course. Through an online quantitative survey (n = 330), we sought preferences from participants in 73 countries for animation design prototypes to be used in video-based, globally scalable, health communication interventions. To learn more about these preferences, we conducted in-depth interviews (n = 20) with participants selected using maximum variation purposive sampling.

Results

For globally scalable interventions, most respondents preferred animation design prototypes that were free of cultural identifiers, especially when these were localized through familiar-sounding voiceovers. Across global regions, participants favored narrative approaches, short videos and family structures that were inclusive across age and gender.

Conclusions

This study summarizes preferences from participants in 73 countries for a variety of design prototypes that could be used in globally scalable, animated health communication videos. We also present novel content development considerations that could inform future interventions. Our findings suggest that global learners may be willing to accept simplified visuals, designed for broad cross-cultural acceptability, especially if the content is localized in other ways, such as the use of locally resonating narratives and voiceovers.

Background

Effective and accessible health communication media interventions are increasingly recognized as key strategies for increasing basic health literacy and promoting healthy behaviors.^{1–5} Researchers have thus called on professionals in the related fields of health communication, health education and health literacy to join forces in developing interventions that are compelling and effective for promoting behavior change.⁶ A growing body of research also emphasizes the need to design communication interventions that are accessible across diverse global audiences.^{1,3,6,7} Key solutions could lie in designing interventions for “glocalization”, the adaptation of global content for local resonance.⁸

Research suggests that health communication for global health literacy promotion needs to take into account cultural factors that may influence health in different target audiences. Thoughtful integration of these determinants has been identified as a cornerstone of effective interventions.^{3,9,10} If our goal is to promote health literacy globally, including reaching marginalized audiences, we must design health communication interventions from the outset with an appreciation for global cultural variation.^{9,11,12}

Socio-cultural considerations influencing message design, narrative, and visual elements require close attention when designing animated health communication interventions.^{13,14} Prior research on the use of animated videos to promote agricultural knowledge gains in low- and middle-income countries (LMIC), showed high long-term retention of information (98%) and solution adoption (89%).¹⁵ This research underscores the potential of animated videos, dubbed in local languages, to cost-effectively reach a broad range of global learners, including those facing literacy barriers and geographic isolation.¹⁶

The Pilot Intervention in South Africa

In 2018, we created a video-based maternal child health communication intervention in collaboration with the South African National Department of Health. Our shared goal was to design and produce a series of story-based, short videos aimed at improving health literacy on key maternal-child health topics. The videos were also intended to optimally engage a broad spectrum of parents and caregivers across this culturally diverse country.¹⁴ In designing this intervention, the team faced several challenges:

- 1) We needed to effectively communicate key health messages, while overcoming literacy barriers and facilitating easy translation into different languages.
- 2) Our animation design prototypes needed to be universally acceptable while maintaining viewer engagement.
- 3) Since data costs in South Africa remain high, the videos needed to be small (2–10 MB) to facilitate equitable access for all communities.
- 4) To help viewers identify with characters and settings, we needed a protocol for glocalization, ie: localizing content that had been created for a broad, global audience.

A collection of existing approaches, combined with contemporary digital solutions, allowed us to address these challenges:

- 1) The use of narrative has shown great promise in the field of health communication, especially for populations with diverse literacy levels. Entertainment-education, storytelling, and testimonials are increasingly being deployed to communicate health messages, persuade and motivate behavior change.⁴
- 2) Universal design for learning (UDL), a theoretical framework originally developed to accommodate those with learning differences, has been successfully applied to the design of culturally inclusive health literacy interventions.³
- 3) The digital simplicity of vector-based, two-dimensional character animations facilitates compression into small files and optimization for mobile viewing.
- 4) The children's entertainment-education industry has demonstrated the great potential for glocalizing video content by capturing local, community voiceovers to enhance viewer identification with the content. Research documenting the glocalization of Sesame Street by the Children's Television Network, in the 1970's, demonstrated the power of a structured approach to local language dubbing. This involved collaboration with in-country educators and local voice artists, facilitating the global scaling of this iconic television series.^{17,18}

We integrated these approaches to facilitate glocalization, by featuring local voices,¹⁹ designing simple, vector-based characters for accessibility across audiences and integrating narratives in an entertainment-education approach. A major, underlying goal was to enhance emotional appeal and character identification, highlighted as important strategies in the behavior change, communication science, and education literature.^{17,18,20-23}

Following the launch of our pilot intervention²⁴, we received requests to adapt some videos in the series for use in rural China, Guatemala, and Burkina Faso. While we had gathered in-country feedback from diverse local audiences during the development of the initial intervention in South Africa, we recognized a shortage of research on visual design preferences for health communication across global audiences. In this study, we use a mixed-methods approach to gain a broad sense of global design preferences, as well as a more nuanced understanding of those preferences. We summarize feedback from participants in 73 countries on a set of geographically and culturally non-specific prototypes. We also present novel content development considerations that have already served to inform the design of a globally scalable coronavirus disease (COVID-19) prevention intervention and could serve to inform similar interventions in the future. Especially in the midst of a global health crisis, the COVID-19 pandemic, the need for evidence-based, globally scalable, accessible and compelling health communication media has become increasingly clear.

Methods

During the development of the pilot intervention in South Africa, we applied a Human Centered Design (HCD) approach to the development of eight animation prototypes (see Fig. 1).¹⁴ HCD involves a process of rapid prototyping, iterative cycles of feedback from target audiences and re-design by the development team.²⁵ The earliest formative feedback, shaping the development of the eight prototypes, was gathered within South Africa in 2018, through our interactions with the South African National Department of Health and a large community-based maternal child health organization engaged in community health promotion.

Mixed methods approach

In this study, we deployed a mixed-methods approach, using a sequential explanatory study design²⁶ consisting of a quantitative survey of preferences, followed by qualitative in-depth interviews. We used the results of the quantitative survey to a) inform the selection of interview participants and b) develop the interview guide for the second phase of the study.

Quantitative survey of preferences

We recruited participants for the quantitative survey of preferences from a cohort of learners enrolled in a global, massive open online course, Stanford Introduction to Food and Health.²⁷ The first author is lead instructor for this course, offered on Coursera, a massive open online learning platform serving more than 35 million learners worldwide. Learners enrolled in the Stanford Food and Health course represent more than 95 countries and enroll in cohorts, with a new cohort beginning every two weeks. In April 2019, we gauged interest in participating in a research study, among the most recent cohort of course completers. All learners who expressed interest in participating in research on health communication (n = 642) were invited to complete the preferences survey, where the 8 design prototypes were presented (see Fig. 1). We obtained informed consent digitally via an information sheet, sent to learners by email. Participants were not offered any financial or other incentives for their involvement. Three hundred and thirty participants, from 73 countries, completed the quantitative survey of preferences. The demographic characteristics of these participants are described in Table 1.

Table 1 Demographic Characteristics of Study Participants

Characteristic		Global Region	Participants (n=330)	
Gender Identity			n	%
n=330	%	USA & Canada	105	31.8
female	80.0	Western Europe & Russia	56	17.0
male	19.4	Latin America	49	14.8
prefer not to answer	0.6	Eastern Europe & Russia	28	8.4
		Middle East / North Africa	24	7.3
		Southeast Asia	24	7.3
Education (years of formal schooling)		Sub-Saharan	20	6.1
n=330	%	East Asia	13	3.9
0-6	0.6	Oceania	6	1.8
7-12	1.5	Prefer not to answer	5	1.5
13-18	44.8			
18+	52.7	Participants living in		
prefer not to answer	0.6	countries characterized	129	39.1
		as low- or middle -income		
		by the World Bank (2019)		

Respondents sorted, ranked, and rated the prototypes in several ways to convey their preferences: they sorted prototypes into categories of would, might, or would not resonate with a global audience and then ranked, from most to least favorite, the prototypes in the “would resonate with a global audience” category. Participants then rated all prototypes on a 6-point scale and sorted them into three categories to indicate whether they expected the prototypes to resonate with people in their region (would likely resonate, might resonate, would not resonate). Using open-ended feedback and qualitative pile sorting,²⁸ respondents also expressed their opinions on which prototypes they felt would be most likely to resonate globally.

Qualitative interviews

A majority (n = 224, 68%) of survey respondents indicated a willingness to participate in a follow-up in-depth interview. From those who volunteered, maximum variation purposive sampling²⁹ was used to select 20 respondents from whom we could elicit the widest variety of perspectives (across geographic location, gender, age, years of education, and style rating patterns).

Interview participants were shown short video animations incorporating the animation prototypes they had previously ranked in the online survey. They were also provided with a single-page reference document containing the eight prototypes and their corresponding names, as presented in the survey. Participants were asked to reference the video samples and the prototypes during interviews, which occurred over a two-month period following completion of the online survey. Participants were asked to describe why they felt drawn to or put off by certain prototypes, they were also asked to provide thoughts on characteristics that would be important for globally scalable content.

Interviews were conducted by a co-investigator who is a full-time staff member at Stanford’s Digital Medic South Africa program, a health education and evaluation team based in Cape Town, South Africa. We conducted regular debriefings with the co-investigator who conducted all 20 interviews, as recommended in the literature.³⁰ This helped to enhance interviewer skills as well as gaining early insights into emerging themes. As suggested by McMahon & Winch (2018)³⁰ debriefings also allowed us to rapidly share emerging data within our production teams and with collaborating stakeholders, thereby shaping the developmental trajectory of ongoing health communication projects. Following each interview, audio-recordings were uploaded and coded by two co-investigators and assessed for inter-coder reliability. The interviews were also transcribed and specific quotations relevant to each code were collected and organized in a shared Google Drive document. As themes emerged from the early interviews, the interview guide was adapted to include questions focused on these themes, including questions related to the use of a narrative approach to animated video health communication and qualities that make a narrated voiceover credible and engaging. Additional themes that emerged during the interview process included optimal video length, ideal number of learning objectives, as well as the portrayal of family roles in health communication videos. Grounded Theory was used to inform our decisions regarding the point at which saturation had been reached, namely when no new codes emerged and when additional interviews failed to lead to additional emerging themes.^{31,32}

Results

Surveys

Most respondents indicated preferences for three or four of the eight design prototypes when asked which of these they felt would be most likely to resonate globally. Across the design prototypes, Mercury was most commonly preferred, with 62% of respondents categorizing it as “would resonate very well for global learners” and 46% ranking it as the first or second most-preferred design prototype. Earth was the second most preferred, with 60% of respondents categorizing it as globally resonant and 32% ranking it as the first or second most-preferred (see Fig. 2).

When assessed by region, Mercury and Earth were frequently ranked within the top three most preferred design prototypes. This preference was consistent for both local and global video interventions across respondents who lived in the USA & Canada, Western Europe, Latin America, the Middle East & North Africa, South Asia and Oceania. Respondents living in East Asia did not commonly include Mercury in their top three preference rankings and those in Sub-Saharan Africa tended to rank Saturn higher than Mercury, (see Fig. 3).

Of note, respondents in some regions indicated different preference rankings locally compared with the design prototypes they expected to resonate globally. For example, in East Asia and Latin America, respondents frequently expected Neptune to be preferred locally, but did not similarly anticipate it to resonate globally.

Similarly, when asked to sort all of the design prototypes respondents anticipated being preferred both regionally and globally, in a pile-sorting exercise, Mercury and Earth were most frequently included (68% and 67%, respectively). Six of the designs (Mercury, Earth, Saturn, Neptune, Venus and Uranus) were included by more than 50%. Respondents were also able to “dislike” designs they felt would not be preferred by local learners in their regions. Venus was disliked by 34% of respondents. Both Jupiter and Mars were disliked by more than 50% of respondents.

The star rating exercise produced similar results (Mercury, Earth and Saturn receiving the highest star ratings, Mars and Jupiter the lowest). A minority of respondents (14%) opted to provide no response to the star rating exercise (see Fig. 4).

Interviews

Several questions were consistently explored across all interviews. We asked respondents for their views on a variety of considerations applied to the design of animated content for global audiences. Within this context, respondents were probed regarding visual characteristics that either drew participants to certain characters or repelled them, as well as preferences regarding characters, backgrounds/settings and color choices.

Probing questions posed in the original structured interview guide elicited several primary themes that were directly related to design prototype preferences. Additionally, during the coding process, several new, secondary themes emerged. After noting these emerging themes, we adapted the interview guide to specifically probe on these topic areas. In this way, the interview guide became a living document, responsive to feedback from previous interviews. The investigators agreed that saturation had been reached when interviews 15–20 revealed no new codes, in line with definitions in the literature on qualitative in-depth interviews.^{31,32} Summaries of information gathered and codes generated are presented in Table 2.

Table 2: Summaries of main emerging themes elicited during in-depth interviews	
Code	Summary
Glocalization	The majority of respondents felt that the simplification of character and setting representations was both acceptable to them and an effective strategy for designing visuals that would resonate cross-culturally. Several respondents suggested that simpler visual representations of characters facilitated the individual viewer's projection of familiar identifiers onto the characters. A few respondents felt that extremely simple character representations might not be able to elicit the level of identification needed to transport the viewer in a way that facilitates audience engagement. Most respondents felt that the use of compelling voiceovers and narratives could help to overcome the challenges associated with simple, universally applicable imagery. In China, one respondent noted that videos reflecting obviously foreign characters and settings might elicit positive, aspirational sentiments, compared with those that are universal or familiar to the viewer. This hypothesis was not echoed by respondents in other countries. In both in-depth interviews and open-ended survey feedback, the prototypes that incorporated ethnic identifiers were more likely to be preferred within regions where those identifiers were felt to be familiar, but less preferred for global resonance.
Color	In general, respondents expressed a preference for high contrast or bright, solid colors as a means of supporting viewer engagement and also as a suggested way of making content accessible to those in need of visual accommodations. Respondents from different regions mentioned region-specific associations with select colors that should be taken into account when deciding on a universal color palate, (for example, one respondent felt that red might commonly be associated with death or danger among Korean audiences).
Family portrayals	Several respondents reflected on the importance of considering the potential variation in portrayals of "typical family" structures and depiction of traditional roles. This was specifically referenced with regard to gender norms regarding child caregiving roles. These respondents expressed a preference for inclusive representations of diverse family structures.
Voice	In general, respondents felt voiceovers should ideally be tailored to align closely with both local language and familiar-sounding voices in order to optimally enhance learner identification and engagement with the content. A minority of respondents expressed a fascination with the novelty of an unfamiliar accent but qualified this by noting that they felt many people would stop listening or dismiss messages delivered by a narrator with an unfamiliar accent. Many respondents felt that featuring a child's voice within the narration was compelling. Some perceived benefits, noted by respondents, included: a) the neutrality/innocence of the child's voice, b) the feeling that a child's voice was considered "cute" and was therefore potentially less patronizing or directive than instructions coming from an adult. A minority of respondents felt that a child should only narrate videos for other children as a child's voice would not carry the same authority as an adult's voice.
Use of narration/stories	A majority of respondents expressed a preference for a narrative approach to instruction (vs. a more traditional approach focused on simply relaying information). These respondents felt that simple animations were effective as supporting visuals for narratives and could more effectively be universalized, while the voice of the narrator should ideally be tailored to the region.
Video length	Respondents expressed a preference for short (2-5min) videos for health communication purposes, with no more than 2-3 key messages per video.

Discussion

Continually evolving health communication approaches and technologies present new opportunities for delivering health information to global audiences. This becomes increasingly important during global public health crises, when evidence-based health information needs to be communicated quickly across

global regions. The ability to convey evidence-based health messages globally, including to remote or under-resourced communities, reflects a growing potential to address global health disparities in access to health information.^{5,33–37} However, the ultimate success of these innovations in health communication will depend on their capacity to be compelling, accessible and applicable for individuals with widely differing life experiences.

Applying Universal Design for Learning (UDL) principles to the practice of creating globally scalable digital health tools, is a potentially powerful strategy for improving access to health information.³ The UDL framework was originally developed to increase accessibility of educational materials for children with special needs.²³ Certainly, we are not equating cultural affiliations with special needs. However, by considering the needs of *all* potential users of an intervention from the start (one of the core tenets of UDL), the design of health communication interventions becomes more accessible to a broader range of global audiences.²³

Even when they reach the audiences who need them most, health communication interventions may fail when their behavior change messages arouse motivations to reject them. This phenomenon has been long-documented in the behavior change literature as the psychological reactance theory.³⁸ The theory posits that a perceived threat to an individual's behavioral freedom (ie: through external direction to change that behavior) can trigger attempts to re-establish a sense of freedom by actively engaging in the threatened behavior.³⁸ Reactance can be measured and therefore modulated through thoughtful design of persuasive health messaging.³⁹

The field of communication science offers powerful message design strategies for overcoming reactance and achieving behavior change, including recommendations around message framing, the use of narratives,^{4,40} and supporting visuals.⁴¹ Identification with the messenger can yield more persuasive messages than those in which the source of the message is perceived as dissimilar, foreign, or not admirable. Health messages that elicit emotion in the target audience, such as hope or compassion, can be particularly effective for changing behaviors through conviction rather than simple persuasion.⁴¹ Audiences who detect that emotional appeals are crafted *primarily* for the purpose of persuasion may reject the associated health messages.^{42,43} Additional research is needed to better inform the design of effective, animated health communication interventions optimized to reduce reactance. Questions also remain about how to craft video interventions that elicit emotion in ways that support engagement and underscore health messages. To this end, the thoughtful integration of narrative and entertainment-education may become even more important approaches to increasing health literacy and eliciting behavior change.^{4,9,44,45}

Involving target audiences in the narrative development and delivery, ie: using a human-centered design approach, may support emotional appeal and identification with characters and messages. These have been highlighted as effective engagement strategies in the behavior change and communication science literature.^{14,25} We applied these strategies in the creation of our pilot intervention and the approach has

since been incorporated into the health delivery strategy of the South African National Department of Health: 1) the Road to Health Campaign video series²⁴ and 2) the “Grow Great” (maternal child health and stunting reduction) video series, created in collaboration with South Africa’s DG Murray Trust.⁴⁶ The earliest prototypes of these animated videos were also part of the intervention arm of an ongoing randomized controlled trial involving 84 community health workers and 1500 expecting mothers in South Africa.⁴⁷ Additional evaluations are urgently needed to better understand the potential for “glocalizable” animated, video-based health communication interventions to improve knowledge, attitudes, behavioral intentions, and ultimately health outcomes.

Conclusions

Rather than a set of fixed conclusions related to global preferences for design prototypes, we offer two sets of considerations that will help to inform the development of more culturally versatile interventions. These include:

a) *The degree to which visuals need to be localized for each audience:* Our data suggest that global learners may be willing to accept simplified visuals, designed for broad cross-cultural acceptability. This acceptance is enhanced if the content is localized in other ways, such as the use of locally resonating voiceovers. Localizing the audio only can help to offset the relatively cost- and time-intensive process of customizing visuals for multiple audiences. Care may need to be taken to ensure that social and familial roles are represented in ways that are varied enough to be inclusive of the broadest possible audience. This may mean, for example, including a variety of permutations of family structure or taking care not to perpetuate gender stereotypes around childcare or the provision of food for the family. The goal should be to design for the broadest audience. Approaches to glocalization, successfully used by the children’s entertainment-education industry, include the addition of “cut-ins” or short segments of highly localized video content added strategically at specified points in the video to help viewers identify with it.^{17,18} The thoughtful use of color should also be considered, both with regard to the potential significance of certain color choices in different global regions as well as the opportunity for color to be used in a way that facilitates accommodation of learners with differing abilities. Color may also be used to enhance the viewer experience on mobile devices, with contrasting colors being easier to differentiate on smaller screens.

b) *The degree to which voice and narrative need to be localized for each audience:* Our data suggest a general acceptance of narrative approaches to health education and communication. These findings echo existing data that support the role of narrative approaches for health messaging.^{4,48} Narratives may be especially appropriate when developed with input from the target audience, using a human-centered design approach,¹⁴ and when accompanied by visuals that invite generalizations and facilitate the creation of analogies by the learner.⁴⁹ The use of narratives may also be a powerful way to support the inclusion of audiences with limited literacy and those with rich oral traditions. Storytelling lies at the foundations of the human experience and decades of research underscore its important role in education

and healthcare.⁵⁰ The characteristics of the narrator need also be carefully considered and may vary by audience and content area. For example, harnessing the power of the child's voice, especially for relevant topics like maternal-child health and nutrition, could be an innovative way of increasing engagement and overcome reactance towards behavior change messages. Larger-scale studies are needed to further explore this approach.

In this study, our main limitation was the fact that the platform, from which participants were recruited, does not reflect the breadth of socio-economic and educational diversity we ultimately hope to reach with our health communication interventions. Eighty percent of our study participants were female and 52% had more than 18 years of education. Coursera also attracts users with at least some English language fluency, although the course from which participants were recruited is offered in 5 languages. Finally, the users of an online learning platform like Coursera likely have a level of technology savviness and an openness to online learning that could influence their preferences for animation design prototypes. While our participant pool did afford us access to a global pool of culturally diverse learners, it is possible that our results are not representative of people around the world who would engage with video-based health communication.

With these limitations in mind, it is worth noting that while this manuscript was being prepared, the global coronavirus disease pandemic 2019 (COVID-19) led the World Health Organization to declare a global health emergency. We used data gathered during this study to inform the rapid development of an animated, global health communication video that could be used worldwide without adaptation. Within ten days, the [resulting video](#)⁵¹ had been viewed more than 1 million times on various social media platforms around the world.

By increasing the accessibility of evidence-based health recommendations, through the design of effective, quickly scalable video health communication tools, we can begin to meet the needs of our diverse global community. The associated social responsibility for providing equitable global access to these tools demands thoughtful, theory-driven, and evidence-based communication approaches – ones that will engage and empower people from different cultures and backgrounds.¹¹ Designing health communication interventions, from the outset, with the potential for glocalization may prove to be both an ethical and a practical approach to improving health communication around the world.

Abbreviations

LMIC – low- and middle-income countries

UDL – Universal Design for Learning

COVID – Coronavirus Disease

HCD – Human-centered Design

Declarations

Ethics approval and consent to participate: This study has been granted ethics approval by the Stanford University Internal Review Board, (protocol #50975). Consent from each participant was obtained through online, written affirmation that the participant had read the information sheet and consented to take part in the study.

Consent for publication: Not applicable.

Competing interests: The authors declare that they have no competing interests.

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Availability of data and materials: The survey data that support the findings of this study are available from the corresponding author. All video interventions cited in this study are publicly available and can be accessed through the Digital Medic YouTube channel or by contacting the corresponding author.

Authors' contributions: MA, CP, TB, SM and JJ led the intervention development and study design. KK, RC led the data collection. MA, KK, RC and VW conducted and advised on data analysis. MA, RC, SM and TB drafted and revised the early versions of the manuscript. All authors read and approved the final manuscript.

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Figures

Figure 1

Design prototypes for animated health communication videos* * Note: prototypes were named after planets to facilitate discussing them without appearing to rank the prototypes (as with Prototype 1, Prototype 2, etc.) and without highlighting any specific feature of the prototype.

Figure 2

Percentage of respondents categorizing each design prototype by likelihood of global resonance

Figure 3

Preference rankings by region of design prototypes expected to resonate globally and locally by respondents

Figure 4

Number of respondents that assigned ratings of 6 stars (best) through 1 star (worst) by design prototype.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Kangarootexture.h264720.mp4](#)
- [COVIDpreventionSoM.mov](#)