THE CLINICAL TEACHER ASME

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How to Codesign Infographics to Teach Clinical Skills

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ABSTRACT

We outline the 10-step process that we used to codesign infographics to teach ophthalmic clinical skills. Infographics were designed to complement preexisting resources. Drawing on educational theories such as Dual Coding and Multimedia Learning, we demonstrate how infographics can enhance engagement, understanding, and recall. We adopted a copedagogical approach by involving medical students, clinical educators, and curriculum leads from the outset. Copedagogy supports collaboration and can improve the quality of education. Our approach incorporated medical student perspectives with focus groups and the audience participation application 'Slido'; this enhanced the relevance of our infographics and helped foster deeper student engagement and learning. We highlight the importance of inclusivity by aligning our designs with Universal Design for Learning principles and best practices for accessibility. Although copedagogy may be time intensive, we found it highly rewarding, with benefits for all stakeholders. Through this How To paper, we hope to encourage others to create visually engaging, inclusive, and learner-centred resources that align with modern educational needs.

1 | Introduction

Infographics combine images and text to form a concise, engaging communication tool. Infographics are popular in politics, business, research and healthcare [1, 2]. Although their use is limited in medical education [3], there is increasing demand for educators to adapt to students' learning and digital preferences to contemporise curricula [2, 4]. With the acceleration of online learning in the digital and postpandemic era, digital-visual literacy is a key skill. Today's students benefit from educational resources that align with their digital preferences, making infographics an effective adjunct to traditional resources.

Medical education often relies on text-heavy resources, which may not suit all types of learners. Cognitive Theories of Multimedia Learning and Dual Coding Theory suggest multimodal resources, such as infographics, can enhance engagement, comprehension and recall [2, 4, 5]. Fleming's VARK model is a widely accepted framework for understanding learning preferences, and most learners prefer a multimodal approach [6]. Infographics cater to various learning styles, particularly visual learners, and can be designed according to the Universal Design for Learning (UDL) principles, which advocate for flexible, inclusive learning resources [7]. Furthermore, infographics designed by students support kinaesthetic, active learning strategies and Constructivist Learning Theory, which deepens understanding [8].

Infographics are disseminable resources, well suited for online and blended learning environments, which are gaining traction in the digital era [5, 9]. Students, as 'digital natives', have digital skills and expertise that support a copedagogical model for developing educational resources. Copedagogy is an 'approach to understanding the impact of collaboration on students' learning' Dyer 2019 [10]. Collaboration between students, educators and institutions can enhance resource quality and optimise student motivation, engagement and performance [11].

> *"Infographics cater to various learning styles, particularly visual learners."*

Moorfields Eye Hospital's undergraduate directorate teaches hundreds of medical students annually during their ophthalmology rotation. Clinical skills sessions are supplemented with comprehensive but text-heavy resources, which may not suit all learners [2, 6]. To address this challenge, we cocreated infographics for ophthalmic clinical skills. A group of key stakeholders, including medical students, clinical teaching fellows and curriculum leads, developed infographics on six ophthalmic clinical skills, such as visual acuity, direct ophthalmoscopy and slit-lamp assessment. Infographics were iteratively refined with student feedback via focus groups and evaluated using qualitative methods.

This How To paper outlines 10 steps for cocreating infographics to enhance teaching and learning, drawing on educational theories, literature and our experience. Our work builds upon best practices for infographic design by also incorporating copedagogy [1, 2, 12].

1.1 | Outline Up-To-Date Source Material and Key Learning Objectives

Start by defining clear educational goals for your infographics. You may wish to use preexisting departmental text-based resources as source material, with learning objectives already defined. Outline the most common clinical skills you want to teach and create an infographic for each skill.

1.2 | Select Your Digital Software

Choosing the right design platform is crucial for usability and collaboration. Students, as digital natives, may be able to introduce new software to educators. Students and educators can work together and experiment with different software. We suggest Canva, Google Draw, Adobe Illustrator and Microsoft PowerPoint.

1.3 | Consider the Infographic's Context

Educators should consider using infographics to introduce new content to students and reinforce key concepts or as a revision tool. In addition to infographics, share preexisting text-based resources with students as a comprehensive reference. Evidence suggests infographics are most effective when used as adjuncts to existing clinical skills resources rather than as standalone tools [3, 4]. For example, Bicen and Beheshti's [9] students valued the easy-to-comprehend style of infographics, which introduced new topics without extraneous cognitive load. Other studies also suggest infographics reduce extraneous cognitive load, making learning more efficient and enjoyable for students [2, 5]. This aligns with Mayer's Cognitive Theory of Multimedia Learning [5], which states that resources with images, colour and logical layouts sustain a learner's attention, facilitating enhanced recall and better comprehension [2, 5].

Infographics are useful for visual learners but also suit multimodal learning preferences. According to Fleming's VARK model (1992), learning modalities are either Visual, Aural, Read/Write or Kinaesthetic [6]; however, the majority of learners prefer a multimodal approach. This preference was evident from our students and also Biro et al. [3], in which infographics were integrated into medical education. By using infographics as an adjunct to text-based resources, educators can cater to a broader range of learning preferences, enhancing accessibility and student engagement [3, 6, 13].

1.4 | Make Infographics Memorable and Visually Appealing

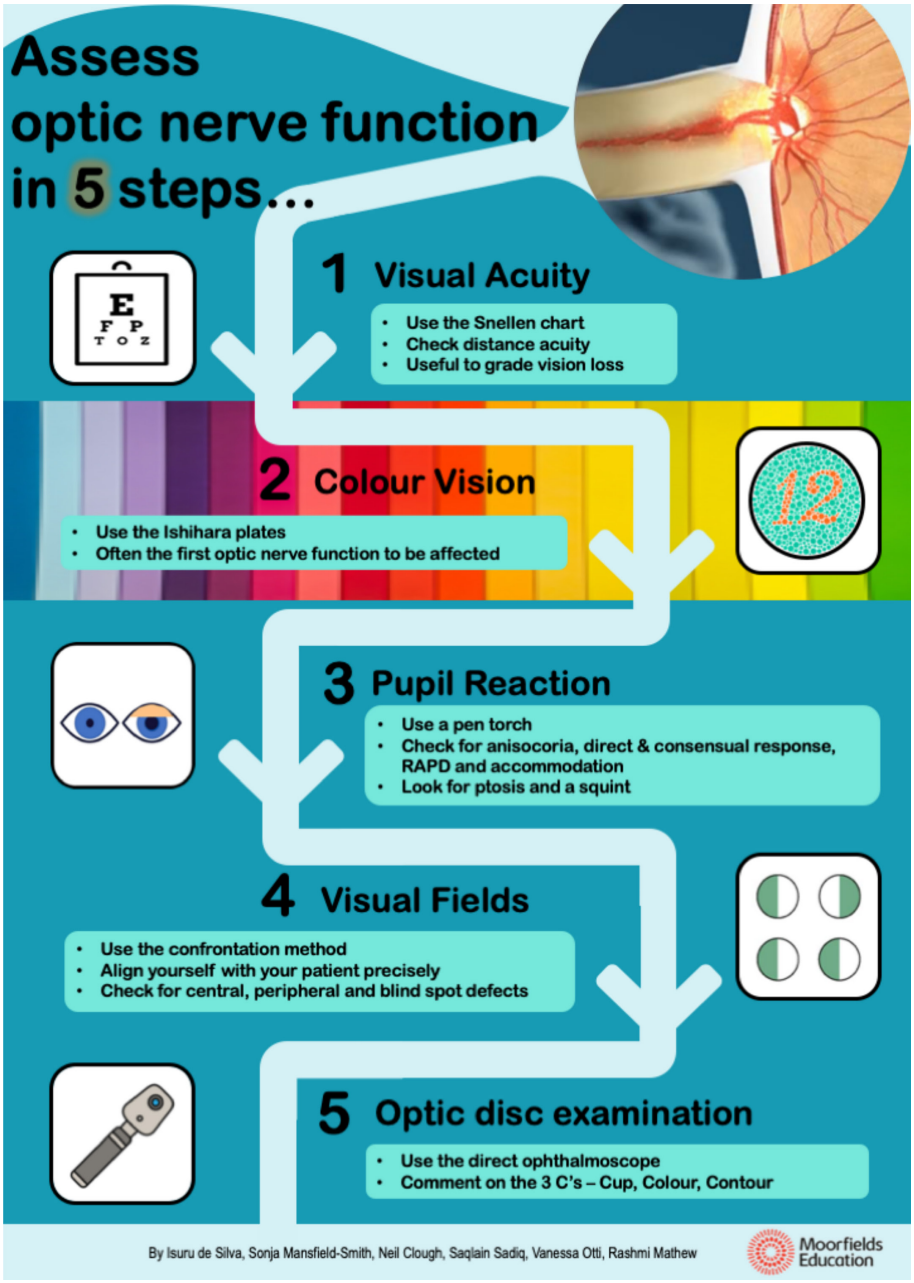
The layout and design elements, such as colour, image placement and typography of infographics, can enhance recall, sustain attention and improve comprehension [2, 5].

Ensure infographics are accessible and inclusive by incorporating best practice design principles such as the Universal Design for Learning (https://udlguidelines.cast.org) and accessibility recommendations from the British Dyslexia Association (www.bdadyslexia.org.uk). For students with dyslexia, using clear sans-serif fonts, bold text and consistent colour schemes supports readability [13].

Reduce unnecessary text to avoid cognitive overload. Simplified layouts and visual cues, such as icons and colour coding, improve visual flow and guide students through the content. Use a complementary colour palette and visual hierarchy to communicate key messages. Some design platforms mentioned in Step 2 offer templates that adhere to best practices, as well as colour palettes. These adjustments benefit diverse learners while enhancing clarity and reducing cognitive load. For example, Matrix and Hodson [4] showed that educational infographics catering to several learning styles can improve student satisfaction and academic performance [4, 6, 13].

The concept of visual literacy underpins infographic design. Visual literacy is finding, analysing and evaluating images while applying meaning to them [4]. We also use this term to describe how the visual appeal of an image can enhance learning. Visual appeal is important in meeting students' educational expectations. In our digital era, images and videos have evolved into a readily exchanged 'social currency', facilitating faster communication and improving user experience across digital platforms [9]. As students are increasingly immersed in visual media, educational resources should meet evolving expectations for clarity, engagement and professionalism. Therefore, infographics that are modern, well structured and visually coherent are more likely to be impactful. Dual Coding Theory [5] supports the benefits of infographics. This theory suggests that learners understand and remember information better when it is presented through both images and text, as this activates two cognitive pathways rather than one, enhancing comprehension and recall.

> *"Visual appeal is important in meeting students' educational expectations."*



Photograph 1: Optic Nerve Assessment Infographic.

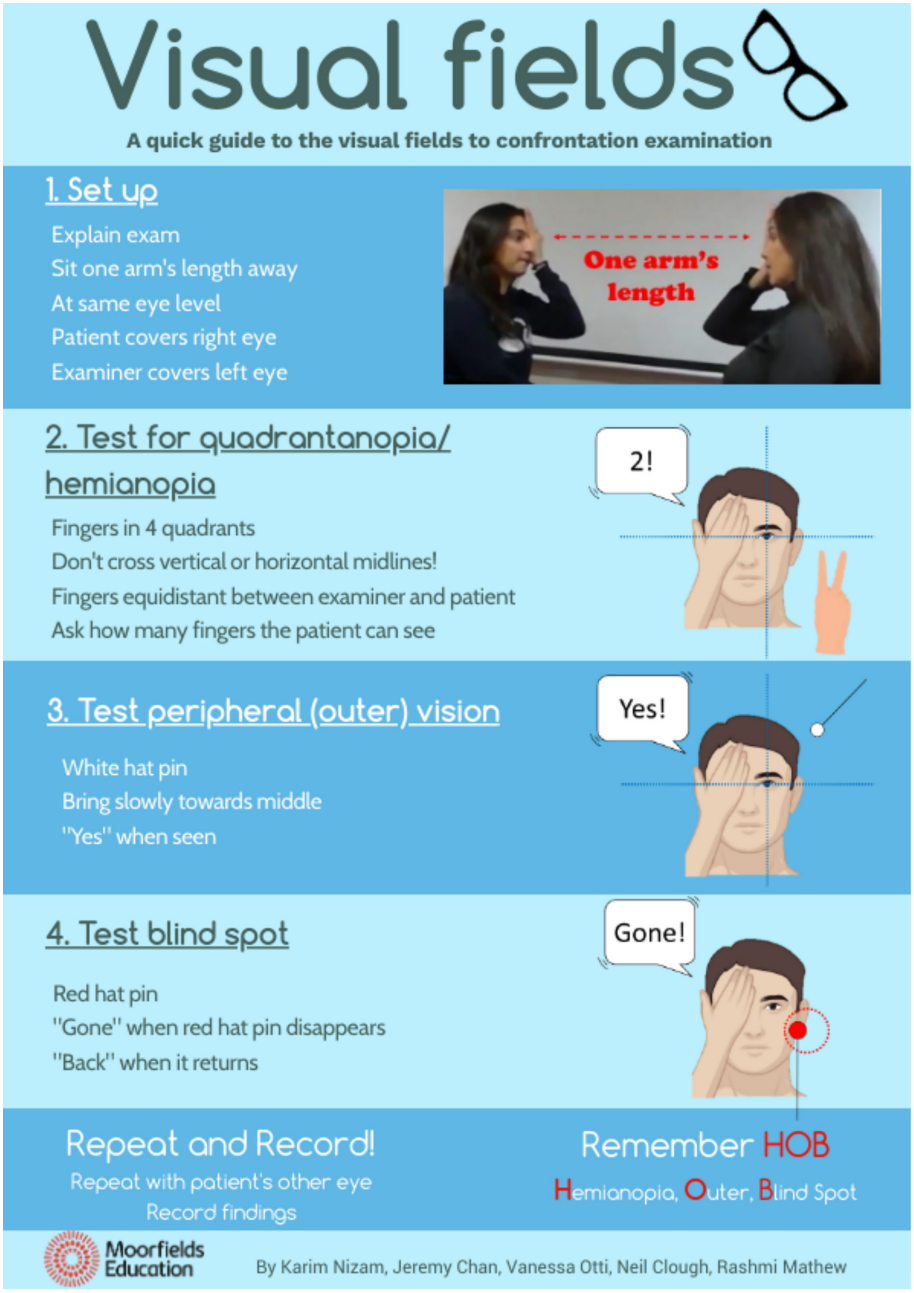
1.5 | Make the Content Engaging

To make the content more engaging, add mnemonics, images of normal and pathological findings and common exam pitfalls. For digital versions, hyperlinks to more comprehensive resources are a valuable addition.

1.6 | Codesign Infographics With Stakeholders

Engaging stakeholder representatives from the beginning to the end of infographic design enhances their relevance. Collaborate with medical students, clinical educators and institutional leads where possible. In an era where digital fluency and design expectations are high, copedagogic design helps resources remain aligned with evolving learner preferences. Institutions that embrace this shift are more likely to promote inclusive, student-centred learning [4]. Copedagogy can also enhance student engagement and understanding. Self-determination theory provides a framework for understanding the success of copedagogy in infographic design [11], as learners are more motivated when their needs for autonomy, competence and relatedness are met. Table 1 summarises the mutual benefits of copedagogy for students, educators and institutions [10, 11, 15].

> "*Copedagogic design helps resources remain aligned with evolving learner preferences.*"



Photograph 2: Visual Fields Infographic.

1.7 | Seek Student Feedback

Student feedback is important in developing effective infographics. Educators should collect feedback throughout the design process to ensure resources are relevant, engaging and accessible to diverse student groups [9]. Minimising power differentials and creating an environment where students feel safe to express opinions without fear of repercussions help encourage honest feedback and collaboration. Using neutral facilitators, such as peer moderators or teaching staff unaffiliated with student assessment, can help reduce hierarchy and increase participation [11].

Consider using a blended feedback approach: combining focus groups, semistructured interviews (Appendix A) and anonymous tools like Slido to collect written responses (www.slido.com) in tandem. The anonymity of Slido can help gather more diverse student perspectives, especially from those less likely to speak up in group discussions.

Historically, educators have sought feedback from students through anonymous questionnaires after teaching, which does not permit partnership. Where possible, feedback should be iterative, seeking feedback each time improvements are made to infographics to help improve relevance (Figure 1). An iterative feedback process aligns with Constructivist Learning Theory [8], which suggests students learn best when actively engaged in knowledge construction. Involving students through cocreating infographics encourages critical engagement with resources, fostering partnership and a sense of ownership.

TABLE 1 | Benefits of copedagogy in infographics from the perspective of each key stakeholder.

Stakeholder	Implications of copedagogy in educational resource design	Learnings from our experience
Students	• Resources designed with student input are likely to be more useful for their learning [3, 12]. • Developing and critically evaluating resources deepens students' understanding and motivation to learn [3, 12]. • Minimises hierarchy concerns [10].	• Copedagogy fosters student agency and belongingness. Some students continued to participate in departmental resource design. • Designing infographics improves digital-visual literacy and communication skills.
Educators	• Students bring unique expertise • Improves quality of resources [14]. • Increases student engagement [15]. • Immediacy of feedback through focus groups can improve feedback quality • Evokes reflective practice.	• Gained new digital and communication skills. • Developed proficiency with new software. • The anonymity of using the Slido app alongside focus group discussion facilitated honest feedback from students who might not feel confident giving verbal feedback.
Institutions	• Can increase belongingness and improve relationships between students and educators [3, 15]. • Increases innovation and enables contemporising of educational resources [11]. • Can improve student satisfaction and performance compared to educator-led approaches [3, 13]	• Infographics are easy to share online, which can increase an institution's reach [9]. • Stakeholder engagement in creating educational resources enables optimal development and targeting to the learner's needs

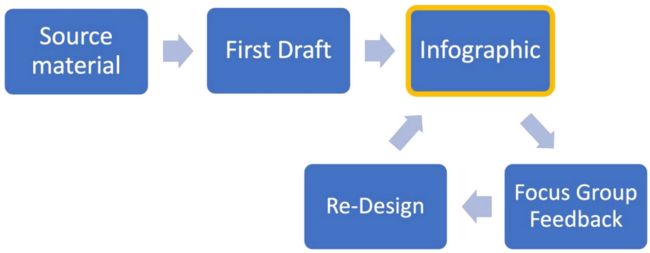


FIGURE 1 | Flow diagram of the iterative infographic design process involving student feedback through focus groups.

1.8 | Analyse Feedback

Use a structured approach to analysing student feedback from focus group transcripts and Slido application responses. Thematic analysis can identify recurring themes (https://www.thematicanalysis.net). Table 2 offers a flexible framework for educators to analyse and interpret infographic feedback. Figure 2 presents an example concept map of key themes and student quotes.

1.9 | Redraft and Seek Further Input

After analysing student feedback, educators should revise infographics and seek further feedback. Incorporating a second round of feedback helps revisions align with student needs while enhancing the quality.

1.10 | Tell Students How You Incorporated Their Feedback

Copedagogy fosters student agency by giving students a meaningful role in shaping resources [14, 15]. However, if their feedback is not implemented, students may disengage. This phenomenon is known as voice fatigue and may be driven by a perceived lack of impact and ownership or competing academic priorities [11]. Seeing tangible improvements based on their

TABLE 2 | Thematic framework for analysing focus group feedback on infographic design. This transferable thematic framework that can help educators structure their analysis of student responses. It defines core themes and subthemes and offers examples of how to categorise and code feedback using thematic analysis. This structure can be adapted to suit other clinical or educational contexts.

Theme	Definition	Subthemes
Visual literacy	Finding, analysing and evaluating images while applying meaning to them [4]. We also use this term to describe how the visual appeal of an image can enhance learning.	a. Design b. Use of images c. Colour
Context	Evaluating where infographics are situated in the student's learning	a. Initial learning b. Exam revision c. Different types of learners d. Broader use
Content	Inclusion of information and graphics to optimise learning	a. Diagrams b. Mnemonics c. Hyperlinks

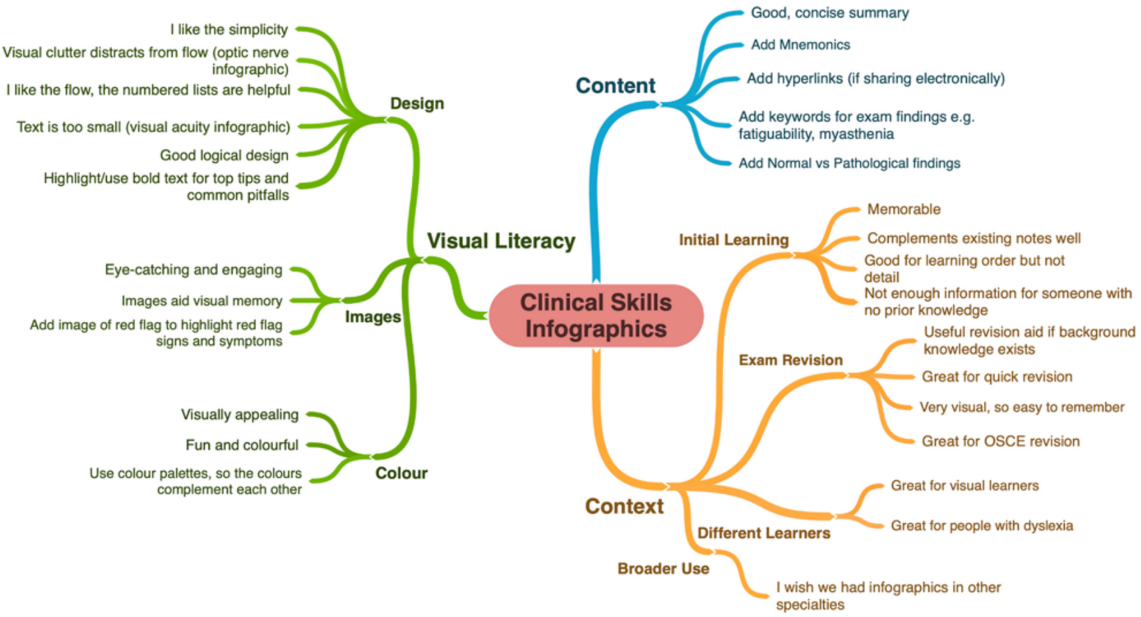


FIGURE 2 | Example concept map of key themes and quotes from student feedback. This concept map visualises how student feedback aligns with core thematic areas identified during analysis. It illustrates the relationship between learner input and actionable design elements, offering a model that educators can use to identify priorities and refine infographic resources more effectively. Concept maps like this are also useful for presenting findings back to stakeholders, demonstrating transparency and impact.

feedback can sustain motivation and encourage continued involvement [11].

2 | Limitations

The brevity of infographics can limit their use; multipage infographics or pamphlets may be useful adjuncts in the future. These steps may only be feasible in some contexts and can be time-consuming for students and educators. As this is an iterative process, it requires long-term engagement and investment from stakeholders.

3 | Conclusion

Incorporating infographics into medical education suits contemporary learning styles and can deeply engage learners. By placing the user at the centre of resource design and incorporating their perspectives, educators can democratise learning and better meet the needs of learners. Copedagogy has several benefits for students, educators and institutions and is a powerful strategy to create high-quality, user-centred resources.

Author Contributions

Vanessa Otti: conceptualization, methodology, investigation, data curation, formal analysis, validation, visualization, software, project administration, resources, writing – original draft, writing – review and editing. **Neil Clough:** conceptualization, methodology, investigation, data curation, formal analysis, validation, visualization, software, project administration, resources, supervision, writing – original draft, writing – review and editing. **Faye Gishen:** conceptualization, methodology, investigation, data curation, formal analysis, validation, visualization, software, project administration, resources, supervision, writing – original draft, writing – review and editing. **Michele Russell:** conceptualization, methodology, investigation, data curation, formal analysis, validation, visualization, software, project administration, resources, supervision, writing – original draft, writing – review and editing. **Rashmi G. Mathew:** conceptualization, methodology, investigation, data curation, formal analysis, validation, visualization, software, project administration, resources, supervision, writing – original draft, writing – review and editing.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Research data are not shared.

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Appendix

1. What are your thoughts on the current clinical skills PDFs?
   a. How engaging are the current clinical skills PDFs out of 10?
   b. How memorable are the current clinical skills PDFs out of 10?
   c. d
2. What are your thoughts on the clinical skills infographics?
   a. How engaging are the infographics out of 10?
   b. How memorable are the infographics out of 10?
   c. How useful are they out of 10?
3. What aspects of our infographics are useful to you?
4. What limits the usefulness of our infographics?
5. How could we improve the infographics?
6. Do you have other feedback or questions to share?
7. If you were to design an infographic, what software would you use?