

**Accessible Research Dissemination Through Data Visualization: Promising Practices for  
the Creation of Infographics**

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### **Accessible Research Dissemination Through Data Visualization: Promising Practices for the Creation of Infographics**

Infographics, or information graphics, are graphic visualizations that combine data, illustrations, text, and images to tell a “story” (Dunal and Lowenthal, 2016). The “story,” or content, of an infographic can vary, as they are frequently used as a vehicle to share various kinds of health information, news stories or, more recently, as a way to disseminate academic research. While infographics differ greatly in terms of the information they contain, the goal behind their creation largely remains the same – to present information in a way that is easy to understand and comprehend while being engaging and attractive (Gareau et al., 2015). Research, specifically, is often dense and, because of the specialized language used, exclusionary and inaccessible to those outside of the specific field of study. Infographics, therefore, are an ideal alternative to classic modes of research dissemination. Creating a successful infographic, though, is not always easy, as presenting complicated and dense content to a wide audience takes time and effort to perfect (Dunal and Lowenthal, 2016).

The Making Research Accessible Initiative (MRAi) has recognized the potential of infographics in sharing information and, as a result, have partnered with a first-year communications course (ASTU 100) to create 11 infographics for the Downtown Eastside Research Access Portal – a database that includes “academic research articles, community publications, reports, research tools and guides, and historical documents” related to the DTES (About). ASTU 100 students collaborate with researchers to create infographics based off of their work – work that can be found through the RAP in its original form. Students first write a plain language summary of the article and then, once approved, design an infographic that will be added into the RAP. In order to ensure students taking part in future iterations of the ASTU 100 project create the most informative, attractive, and accessible infographics possible, it is

necessary to determine what is (and is not) working with the 11 current infographics housed within the RAP.

This paper will examine the various factors of infographics and infographic creation that lend to its status as an alternative method for accessible research dissemination. Even further, it will provide a close look at specific design components of infographics – specifically examining how the layout, colour palette, and typeface selection can contribute to the effectiveness of an infographic and its corresponding ability to convey the desired information to an audience. The paper begins with a literature review that provides a scan of the current research available regarding infographics, using the following headers as a guide: Making the Case for Accessible Research Dissemination, Cognition and Comprehension, Building and Infographic: Creation and Content, and Building an Infographic: Design Principles. The literature review informs an engagement activity that explicitly elicits feedback on the ASTU 100 infographics and, lastly, the findings are analyzed in the discussion section of the paper - resulting in a set of recommendations that can assist in future iterations of the ASTU 100 project.

## **Literature Review**

### ***Making the Case for Accessible Research Dissemination***

Communicating one's research is a key step in the research process. Beyond simply delivering one's research to an expected audience in a clear and effective manner, researchers have an ethical obligation to share their scholarship outside of the academy (Atalay et al., 2019). This can be difficult, though, as elitism is rife within academia and it has many exclusionary practices at its core (Fendler, 2020). One way to challenge the insular nature of academia is to present research in a way that is visually engaging and appealing (Atalay et al., 2019). Presenting research in this way - using ordinary and clear language alongside attractive and clear visuals - is

not always simple, as it does require some level of expertise. This expertise, as Fendler (2020) explains, consists of having the skills to translate specialized language and ideas into widely accessible ways of speaking and understanding. Even if it may be difficult to take the time and make the effort to remove such barriers, which include the use of specialized and dense language, it can be rewarding for the researcher. Making research widely accessible can, ultimately, increase overall participation in the research process and may even increase the researcher's ability to contribute to society in a meaningful, productive way (Mallett et al., 2020).

### ***Cognition and Comprehension***

So, *why* are infographics a suitable option when it comes to accessible research dissemination? Barlow et al. (2021) note that visual aids are a useful and effective mode of communication because of the brain's heightened ability to process visual information. A study conducted by Kung et al. (2020) support this statement, finding that humans can recall almost 6.5 times more information when it is presented through images in combination with text – not solely in written form. Even further, the authors found that 65% of the population self-identify as a “visual learner” and that, because of this fact, presentations using visual aids were 43% more effective at sharing information to an audience due to their compelling nature and ability to keep the viewers' attention. Before moving further, it is also useful to make a distinction between comprehension and perception. Perception “only uses/measures inputs from the environment,” while comprehension “takes that perception and combines it with previous knowledge so that it logically fits the situation” (Albers, 2015, 272). By focusing on comprehension, rather than solely fixating on whether or not the audience can “read” the infographic, it ensures the audience

can use and “understand” the information presented to them while recognizing that outside factors can play a role in the cognitive process (Albers, 2015).

While the previous statistics clearly demonstrate that visualizations in combination with written text is more effective than text or verbalization alone, Gay et al. (2019) dive deeper into exploring the effectiveness of visual learning. Based on the concept of visuocognitive design, which is defined as “the alignment of externally-created visualizations to cognitive processes,” the authors devised six specific principles that can work, in combination, as an audit tool to reference during the creation of an infographic (1). The six principles are clarity, arrangement, cued meaning, intuitive meaning, cognitive fit, and cognitive preference. Clarity refers to the simplification of visuals, as complex concepts are often made even more complex through confusing graphics. This principle is focused on ensuring the visualization is as clear as possible. Arrangement is the visual alignment, or layout, of the elements within an infographic. Gay et al. (2019) suggest that hierarchical organization is the most effective for one’s cognition and, on a more surface level, improves the overall aesthetic of graphic. Cued meaning, the third principle, references the “cued signs” that act as visual facilitators. These cued signs can include context, text, and visual metaphors and work to facilitate the readers recognition and understanding of the graphic. Intuitive meaning, on the other hand, is about recognition *without* facilitation. While cues are important within an infographic, the authors suggest that it is also important to consider if it is possible to understand it without such cues and, even, out of context. Lastly, cognitive preference is the principle that specifically recognizes the users’ individual, unique interaction with the infographic. These visuocognitive principles, when considered during the creation of an infographic, can better close the gap between visualization (what is shown) and cognition (what is interpreted).

Similarly, Garaeu et al. (2015) measured specific cognitive factors to determine what exactly makes infographics so effective at communicating information. The authors measured memorability, searchability, the time required to read the infographic, language used, the use of imagery and graphics, user satisfaction data, and eye tracking analyses. The results found that while infographics may not increase one's ability to recall or memorize information, they do make the information easier to locate and, when the appropriate imagery is used, can help to clarify the text or data on which the infographic is based on. While Garaeu et al. focus on "appropriate imagery," Burgio and Moretti (2017) focus on the decorative elements used in data visualization. These elements, which the authors call "Embellishments," can be included alongside other, necessary elements, to excite the reader and even increase their ability to understand *and* remember the information presented to them. It is important, though, to not overuse embellishments, as too many additional features within an infographic may result in overstimulation and divert attention from the data.

### ***Building an Infographic: Creation and Content***

Before one can begin the infographic design process, the following factors must be considered: who the intended audience is, what story you want to tell based off the data provided, what format – or "type" – of infographic may be the best option to support the narrative that is being constructed, and what visual elements (data visualizations, images, illustrations) will be used to present the information. These factors, when considered in conjunction with one another before design decisions are made, will contribute to the success of one's "infographic thinking." Infographic thinking, as described by Dunlap and Lowenthal (2016), is the "cognitive processing of content or a narrative represented and interpreted visually" (57). This mode of thinking can be further supported by the situational qualities of the



aesthetic learning experience framework. The situational qualities within this framework can be used early on in the infographic creation process to make the proceeding design decisions. These qualities are: immediacy - which is established by involving learners directly (and early on) to create urgency and excitement; malleability – which allows the audience the freedom to determine some personal meaning alongside the intended meaning; compellingness – which refers to the “irresistibility” of the graphic and its ability to keep the audience’s interest and attention; resonance -a sensory experience that results in various connections being made for the viewer; and coherence – the logic, clarity, and consistency of the graphic (Dunlap and Lowenthal, 2016). Therefore, it is useful to keep these situational qualities in mind when considering one’s intended audience, what narrative approach will be used, and the format of the infographic, as they may assist in producing the most effective graphic possible.

**Intended Audience.** While infographics are created to help spread information of various kinds to broader groups of people, it is still important to consider who you hope to reach and who, really, you are creating it for. Hernandez-Sanchez et al. (2020) suggest that this consideration is crucial before entering the design process, as it will likely have some impact on future design decisions. When thinking about audience it may be useful to think in terms of age, population, role, and education level. Abilock and Williams (2014) offer another entry point into thinking about intended audience – asking “Who is [the] audience that cares about this problem?” (50). This question can be approached at varying degrees of specificity.

**Narrative Approach.** For an infographic to be effective the story and message should be clear (Balkac and Ergun, 2018). Therefore, determining a narrative approach is key as it will, ultimately, be the driving force in how the message or story is contained and presented. The narrative techniques that can be used within an infographic are: explanatory, editorial,

persuasive, and exploratory. An explanatory narrative seeks to present information and educate the audience in an objective way, while editorial and persuasive narratives insert value judgements or aim to influence, or sway, the reader's opinion or judgement. Lastly, exploratory narratives test "multiple alternative hypotheses" (Otten et al., 2015, 1902). To determine what approach is most appropriate, one must consider what kind of information or data is being presented and to who you are presenting it to.

**Format or "Type."** Infographics do not fit into one singular box, as there are numerous types and various formats that an infographic may take. As stated through the previous sections, determining the format or "type" of infographic largely depends on the data or information being presented, the audience being reached, and the narrative approach taken. The three main categories of information design - that often overlap - are print-based, interactive, and environmental. As infographics are one possible output of information design, these categories are relevant and helpful to consider on a broader scale. Print-based information design "relies on a single image or sequence of images to convey complex sets of data" using various visuals - including, but not limited to, diagrams, charts, photos, illustrations, and text. In print-based design the audience is passive, as there are no opportunities to interact with the infographic in any way. Interactive information design, as per the name suggests, requires the audience to make active decisions when consuming the information that the graphic presents. The user can navigate it in various ways which may result in different responses or experiences based off of the decisions made. Lastly, environmental information design, while less relevant to the creation of infographics, is still a useful category to be aware of. Environmental information design is used, most frequently, for large-scale information displays that can assist in wayfinding or large-scale installations (Santos et al., 2019).

Yildirim (2017) provides two additional ways to think about, or categorize, the various forms and types of infographics that can exist. First, for a more holistic approach, one may consider the various types and features of infographics in one list. For example, like print-based information design, a static infographic is often an image or PDF. Other types include zooming, clickable, animated, video, and interactive – all of which largely speak for themselves. Secondly, one may think about type solely in terms of user interaction. For example, a non-interactive infographic is one with fixed text and visuals, a semi-interactive infographic (or motion infographic) often includes video and audio components to present information, while interactive infographics are created to enable “top-level reader-content interaction” (251). While there is some overlap between these two categorical lists, with some types or forms fitting in as sub-categories within others, it is helpful to understand – and be aware of - the numerous ways infographic creation can be approached.

**Visual Elements: Illustrations, Images, and Data Visualizations.** Lastly, when thinking about infographics in terms of their creation and content, it is useful to think carefully about what type of visuals will be included. These visuals may be vital in sharing information with the reader (ex. a graph or chart) or the visual may be purely decorative – solely used to improve the aesthetic of the infographic. A study conducted by Dunlap and Lowenthal (2016) found that participants were more responsive to infographics that only used relevant visuals, finding that decorative elements were seen as “distracting” to the overall message (56). Burgio and Moretti (2017) also consider the use of decorative visuals within infographics. As mentioned previously, the authors use the term “embellishments” to describe the additional visual features within an infographic. They suggest that embellishments can be used to aid the information presented but must be done so carefully and properly. An overuse, or reliance, of embellishments

can overwhelm and the reader and distract, whereas – if used properly – they can draw the reader in and keep their attention. It becomes evident, therefore, that a balance must be achieved between necessary, informative visuals and visual elements that are solely included to improve the aesthetic quality of the infographic. While decorative visuals can be useful, it is important to keep the initial reason for the infographic creation in mind – to present information to the audience. One method to ensure that this balance is achieved - and test the relevancy of the visual elements used within an infographic - is to use, what Hernandez-Sanchez (2020) call, the “no text-test.” This test requires the removal of all text from the infographic to determine whether or not the visual features can speak for themselves – without the support of written information. If the “story” is not understood without the accompanying text, the visual elements included are not relevant and/ or clear and should be reconsidered.

### ***Building an Infographic: Design Considerations***

To create an effective, and aesthetically pleasing, data visualization graphic, considerations must be made regarding the structure (or layout), the colour scheme, and the typeface palette. These design features work alongside one another to, ideally, create a cohesive, attractive, and intellectually appealing infographic. As mentioned above, the design process will be heavily influence by previously determined factors such as audience, narrative technique(s), and format, but there are additional design principles that have a major impact on the success of an infographic.

**Structure or Layout.** The structure, or layout, of an infographic can play a major role in its success. A study conducted by Majooni et al. (2017) used an eye-tracking software to determine which structures were the most effective in supporting comprehension and decreasing the work that the reader has to do. To determine which layouts supported comprehension, the

authors looked at the “scan path” of each participant – looking at where their eyes lingered and if they had to restart or “revisit” certain components of the infographic. The results of the eye-tracking and gaze data suggest that using a layout that supports “natural left-right (up-down)” eye movement can improve viewers understanding and enjoyment of the infographic and that vertical columns proved to be more efficient for reading and comprehension versus horizontal rows (265). Barlow et al. (2020), while not providing the same quantitative data, state that the structure of an infographic should be logical and clear with an aim to minimize confusion and reduce misunderstandings.

George-Palilonis (2016) provides a more in-depth checklist of factors (or elements) to consider when determining the layout of an infographic. The first element is balance, which refers to the equilibrium that is achieved when the various components of an infographic are distributed evenly. Symmetrical balance can be obtained when “visual weight is distributed on both sides of a central axis,” while asymmetrical balance occurs when “two sides of a central axis are not identical but still appear to have the same visual weight.” Asymmetrical balance, while seeing like an oxymoron, is often preferable for infographic creation, as this structure “facilitates movement” and “helps guide the eye through the information” (77). Proportion is another important factor to consider when determining the layout of an infographic, as it can establish relationships between the varying elements in accordance to their size. For example, a larger element within an infographic will be seen as the “dominant” focal point and, therefore, will act as the main focus – creating a hierarchy to assist with the reading of the infographic. Using a grid during the initial design process, along with the rule of thirds, can help to ensure balance is achieved and proportions are correct.

**Colour Scheme.** Colour can have an influence on the clarity and effectiveness of the infographic, along with playing a major role in creating an aesthetically-pleasing infographic. Park and Tang (2019) use the following headings to categorize and assess colour preference: active/passive, heavy/light, and cool/warm. The authors found that the participants of their study did not necessarily have a preference between cool and warm toned colours, but the infographics that used *both* warm and cool toned colours were rated higher than those that did not. This could support the argument that contrasting colours can further highlight, or emphasize, specific information or data. George-Palilonis (2016) explores this idea and the various combinations that may create the desired contrasting effect. When using a contrast of warm and cool colours, warm colours will dominate, as they are more vibrant and attention-grabbing. Cool colours are, often, less intense which, as a result, makes them more appropriate for backgrounds. Another combination is light and dark, which uses dark shades along with light shades. Lastly, complementary contrast refers to the use of opposite colours on the colour wheel. This contrast is more dramatic, as the colours used will be very different in terms of value and tone. Each of these contrasting combinations, though, can be used to emphasize information more successfully throughout the infographic.

Referencing a “color checklist” can provide additional guidance when determining the colour palette for an infographic. George-Palilonis’s (2016) checklist states that first, one should strive for visual accuracy. This means that the colours selected should, as closely as possible, reflect reality. This point is supported by Balkac and Ergun (2018), who highlight the importance of using the correct colour for representation purposes (for example – a heart should be red). Next, a consistent choice of colours should be determined. In terms of the “body” text within an infographic (text that is small in size), the author recommends using black – as some other

colours can be difficult to read. Lastly, ensure you do not create false relationships through the use of colour. Readers will create connections based on colour, so be careful that the colour relationships created make sense logically, and visually.

A final consideration, or perhaps the first consideration, that should be made when determining the colour scheme for an infographic is to design with accessibility in mind. Colour blindness, in particular, affects 5.6% of individuals and can alter one's understanding of an infographic if too much meaning is placed on it. Therefore, Barlow et al. (2020) suggest that, while colour is used to emphasize or add tone, it should not be used to *convey* a message. This suggestion is supported by Balkac and Ergun (2018) who note that, for colour to function as a communication tool, it should be subtle and used to apply emphasis – not as the main feature. Even further, some specific colour combinations – including red and green, brown and green, purple and blue, and blue and green – can be difficult for some to differentiate and, therefore, should be avoided (Barlow et al., 2020).

Overall, a colour scheme should be determined to ensure the “harmonious” combination of colour usage within the infographic. A palette can be monochromatic, complementary, or analogous, but each will – ideally – facilitate harmony and create the necessary contrast to support rhythmic reading and comprehension. As mentioned, it is important to keep accessibility in mind during this design process, as some colours can be more difficult to see than others and may, if used, exclude those who are unable to perceive them. To support accessibility, these factors must be considered and adhered to.

**Typeface.** As with colour, a typographic palette (or scheme) can be make the upmost difference in the overall design, and comprehension, of an infographic. Barlow et al. (2020) suggest using no more than three fonts (within one typeface) throughout an infographic. Even

further, each font should have a clear role. For example, the font used for title, the body, and subtitles should be consistent. If there are varying fonts used inconsistently throughout, the reader will likely become confused and will have less success in understanding the information presented to them. George-Palilonis (2016) offers more in-depth suggestions regarding typeface and font. He suggests that, as with colour, a “palette” should be determined early on to maintain consistency and clarity. The specific suggestions the author puts forward are to use sans serif fonts as they are easier to read in smaller sizes, to choose one typeface (with the possibility of introducing a second only if additional emphasis is required) that comes in a variety of weights - as these weights and widths will create contrast, and to adhere to specific font size guidelines (between 18 and 30 point for headlines; 10 to 14 for labels; 8 to 10 for explanatory text or callouts). Overall, being consistent (and keeping it simple) are the main considerations when determining typeface. The typeface should not be distracting or erratic as such changes would likely confuse the reader and disrupt the overall cognitive process of ingesting, and understanding, the information within the infographic.

### ***Conclusion***

Research is often created with one audience in mind – other academics within the same field of study. This approach to research ensures the general public is left out of the important discussions that are taking place – even if these discussions are relevant to their own lives, include them, or are even just of interest. Infographics, therefore, are one way to counter the exclusionary nature of academic research and to disseminate information in a way that is accessible, visually appealing, and educational. Infographics work to support cognition and comprehension through visual learning – as infographics are comprised of various visual elements such as graphs, charts, images, and illustrations. While infographics are a useful



alternative to the typical modes of research dissemination, such as standard research articles, careful consideration must be made throughout the creation process to ensure the information is being presented accurately, clearly, and attractively. Therefore, this literature review provides guidance in the creation of infographics - both before (Creation and Content) and during (Design Considerations) the design process. It is important to determine who your audience is, the type of infographic being created, and the narrative approach being used, before moving on to the layout, colour scheme, and typeface palette. Careful consideration of all of the mentioned components can ensure the most effective, and appealing, information graphic is produced.

### **Methodology**

As previously mentioned, the ASTU 100 project has produced 11 infographics for the DTES RAP. These infographics, because of their intended use, were created based off of research articles explicitly related to the DTES. Therefore, it was vital to gather feedback from participants who are directly connected to the DTES community in some way - be it a community member with lived experience or an individual working at a community organization, as these are two of the key user groups of the DTES RAP. To ensure diversity of participants and opinions, and to create an open-forum for discussion, focus groups were decided to be the most appropriate, and effective, research method for this study.

*Engagement Activity #1* included two peers with lived experiences who are involved with UBC's Transformative Health and Justice Research Cluster. *Engagement Activity #2* included three staff working at a DTES community organization. The three staff members work in varying roles within the organization and could, therefore, offer unique perspectives. Each engagement activity lasted for 45 minutes and offered a space for participants to share their initial reactions of two ASTU 100 infographics, answer open-ended questions related to each

infographic, and to provide insight into their understanding of infographics as an accessible research derivative. Due to the group nature of these activities, participants were encouraged to add to each other's comments and were often prompted by remarks made by their fellow participants. Each focus group was hosted by a facilitator. The facilitator introduced the participants to the ASTU 100 project, provided a brief definition of infographics, and then led the group through the questions and moderated the preceding discussion. A notetaker ensured that thorough notes were taken, as the notes from each session would be analyzed.

The following questions were used as a general guideline to structure each focus group session:

1. Quick-Fire Comparison Activity
  - a. Which infographic is the most aesthetically-pleasing?
  - b. Which infographic is the most eye catching?
  - c. Which infographic has the most logical and clear layout?
  - d. Which infographic most effectively incorporates visual elements into its design?
2. Individual Infographic Analysis
  - a. How would you describe the tone of the graphic? Specifically, in regard to the written text / language?
  - b. How do the visual elements either take away, or add, to the infographic? Or, do they have little to do with your understanding of the information?
  - c. How would you describe the infographic's design?
    - i. Design = layout, typeface, colour palette.
  - d. Would you say that, overall, the infographic helped you in understanding the research article / material?
3. Wrap-up Questions
  - a. What is your overall impression of these infographics?
  - b. In your personal opinion, do you think that infographics are a useful tool in making research more accessible?
  - c. Would you like to see more infographics added to the RAP?
  - d. Any additional feedback or comments?

## Findings

Note – All references to specific ASTU 100 infographics were removed to ensure the anonymity of student’s work.

### *Engagement Activity #1*

Engagement Activity #1 elicited feedback from two individuals who are members of UBC’s Transformative Health and Justice Research Cluster. Both participants have lived experience in the Downtown Eastside (DTES). The infographics chosen for the first session will be referenced to as **Figure 1** and **Figure 2**.

**Quickfire Comparison Activity.** The quickfire comparison activity determined a general consensus regarding the participants initial enjoyment and understanding of the two infographics. The results from the activity are displayed within the table below:

	Participant #1	Participant #2
Most aesthetically-pleasing	1	1
Most eye-catching	1	1
Most logical and clear layout	1	1
Most effectively incorporates visual elements	1	1

**Language / Tone.** Participants agreed that **Figure 1** featured accessible and clear language. One participant stated that the infographic used “pretty simple and understandable language” and, likewise, was successful in terms of the amount of text used. In reference to **Figure 1**, a participant said that it was “to the point [and] not too wordy” (203 words). Conversely, in reference to **Figure 2**, participants agreed that the infographic was “not as easy as to read” due to the jargon included and that it was overly “wordy” (242 words). Both of these

factors contributed to the infographic being described as “intimidating,” “distracting,” and “hard to read.”

**Visual Elements.** Participants favoured the visual elements included in **Figure 1** – stating that the “images were really good,” “eye-catching,” and “simple.” **Figure 2** features fewer visuals (2) but, even with this small number of visual elements incorporated, participants agreed that they were largely irrelevant to the text they were placed beside and, overall, distracting – specifically citing the image found in the header of the infographic. It appeared that the key concerns regarding visuals in this activity were surrounding relevance and placement.

**Design.** Participants enjoyed the layout of **Figure 1**, specifically mentioning the usefulness of the “sections,” as the “bars” used for sub headers made it seem like “each section [was] a different page.” Likewise, **Figure 1** was cited as being easier to read to due it’s “clear white background,” as “nothing was obstructing” the content, while **Figure 2**’s coloured background was not as positively received. Even further, the colour scheme of **Figure 2** was described as “horrible,” with the clashing colours being explicitly referenced.

**Comprehension.** Participants had to reread **Figure 2** due to the previously mentioned “flaws,” which increased the reading time and frustration of the participants. For example, the interference between the header image and the title text caused confusion and feelings of uncertainty from the very start of the reading process. Rereading was not mentioned in reference to **Figure 1** – instead, participants seemed to leave the infographic with a clear understanding of the information included within it, specifically mentioning the visual elements as assisting in this.

***Engagement Activity #2***

Engagement Activity #2 elicited feedback from three Learning Exchange (LE) staff members.

The three participants work in different roles within the LE and have varying roles of interaction with LE patrons. The infographics chosen for the second session will be referenced to as **Figure 3** and **Figure 4**.

**Quickfire Comparison Activity.**

	Participant #4	Participant #5	Participant #6
Most aesthetically-pleasing	4	4	4
Most eye-catching	3	3	3
Most logical and clear layout	4	4	4
Most effectively incorporates visual elements	4	4	4

**Language / Tone.** All three participants noted specific instances of specialized language in **Figure 3**. This type of language was described as “a bit steep,” even explicitly noting that some terms appeared to be “jargon.” One participant suggested that such language could make “digesting the material” difficult, especially for community members who may be unfamiliar with the research area. To remedy this, a participant suggested the inclusion of “explanation or [a] plain language [alternative].” Likewise, **Figure 4** was described as “a bit dense” with some terms being appropriate for “an academic audience,” rather than a casual audience. The amount of text used within both infographics appeared to play a large role in the graphics effectiveness. For example, **Figure 3** (362 words) was described as text-heavy, whereas **Figure 4** (147 words) was described as “sparse” and left participants with “more questions than answers.”

**Visual Elements.** Initial responses to **Figure 3**'s use of visuals included the reiteration that it was "busy" and that the "multiple graphics in a section" took "away from the text." Questions also arose around the relevance of the visuals, with participants wanting to see visual elements that "explain[ed] more," or added to the text itself. Similarly, it was suggested that the decorative visuals could be reduced, as the sheer number made the infographic "noisy." Conversely, **Figure 4**'s was described as "a lot cleaner" in reference to visual elements included – largely in part to the decision to feature one visual per section of text. Likewise, it was noted by participants that the visuals were relevant to the text but could be "a little more creative."

**Design.** The key concerns regarding **Figure 3**'s design were related to colour palette and font. The dark background was effective at making the infographic "stand out" but, alternatively, made the text "hard to read." Likewise, the typeface was, overall, "easy to read" but sizing appeared to be an issue, as both the header and sub headers were the same size – resulting in questions surrounding the function of the text. **Figure 4** was thought to be "easier to read," with participants responding positively to the simple colour palette and white background. The choice of colours were described as "work[ing] really well [together]," as they are integrated throughout the entirety of the graphic and do not interfere with the text. The font, unlike **Figure 3**, is sized appropriately according to the text's function (ex. header is larger than the sub headers) and is large enough to support potential accessibility concerns. In terms of layout, **Figure 4**'s structure supported white space – assisting in the overall simple and clear design.

**Comprehension.** Due to concerns surrounding language and design, participants suggested that **Figure 3** took "too much work" to read and, because of this, it would be difficult to retain the information featured within it. The sheer amount of text made it difficult to pull out the key information and, to ensure a full understanding of the research, rereading had to occur.

**Figure 4**, while being positively received in terms of design, still did not fully support comprehension because of the limited amount of text within the graphic. Likewise, it was suggested that a reordering of the layout may be useful to support reader's ability to understand and retain the most salient information of the article.

## Discussion

**Language and Tone.** All four infographics included varying amounts of specialized language or "jargon." This language was quickly called out by participants – making it clear that the inclusion of specialized terms or jargon could easily be noted by readers and could have a negative effect on their reading experience and understanding of the research. By not providing additional context, definitions, or a plain language alternative, these infographics may intimidate, confuse, or frustrate readers. These feelings could result in the reader not continuing on with the infographic or, if they do read the graphic in its entirety, they may not fully comprehend the information due to uncertainty surrounding language. In terms of word count, it became evident that a "middle ground" may be ideal. For example, the ASTU 100 infographic that had the lowest word count (147 words) left participants "with more questions than answers," whereas the infographic with the highest word count (362 words) was described as "text heavy" and noisy. Therefore, a balance between these two extremes may be of use to ensure the research adequately explored, but without overwhelming readers with text.

**Visual Elements.** The two key areas that students must consider when incorporating visual elements into their infographic are relevance and placement. These two areas were consistently brought up by participants in the focus group sessions, as irrelevant visuals were seen as distracting, confusing, and unnecessary. Visuals that explicitly aligned with the text they were placed beside were positively received and appeared to assist participants in their ability to

understand the research. Conversely, images that were irrelevant to the text caused some confusion, solely because it did not align with the text. The placement of visuals was brought up consistently as well. For example, **Figure 2**'s image in the header conflicted with the text – making the title difficult to read. Likewise, **Figure 3**'s overuse of visuals – placing multiple visual elements in one section – was detrimental the reading process. Therefore, using relevant visuals and ensuring they are placed thoughtfully and sparingly may help to better the reading experience and could assist with the comprehension of text. Lastly, it was mentioned that the use of numerical visuals was helpful in the ordering and placement of information (ex. **Figure 3**) so, if possible, it may be helpful to integrate numerical (or information-based) visuals within the infographic (ex. pie chart).

**Design.** Infographics with simple, clear layouts were consistently favoured during the focus groups. Using sections to demarcate the various sub headers within the research article and using white space assisted in participants ability to quickly read, and understand, the information within the graphic. Likewise, simple colour schemes and white backgrounds were positively received in both sessions (ex. **Figure 1** and **Figure 4**). Lastly, using a sans serif typeface and appropriate sizing was noted to be of importance (ex. Header as the largest size font, sub headers with a smaller size font, etc..).

### ***Recommendations***

Participant feedback was vital in understanding how ASTU 100 students may be able to create more informative, attractive, and accessible infographics for the DTES RAP. It was agreed upon by all participants that infographics are a helpful tool in making research more accessible, as they (if successfully created) offer an approachable alternative to dense, academic research papers that people may not have the time – or desire – to read. Likewise, all participants agreed



that they would like to see more infographics integrated into the RAP, as this will provide users with an option in how they may ingest information and could, as a result, help to bridge a gap between academic research and the general public. Therefore, it is clear that the ASTU 100 project is helping in making research more accessible to the DTES community.

The following set of recommendations were developed in consideration of the extensive literature review and the affirmed through the facilitation of the two engagement activities and the resulting participant feedback:

### **1. Language and Tone.**

- a.** Limit specialized language and / or jargon. If a plain language alternative is not possible, be sure to include additional context and / or definitions to ensure readers of all knowledge levels can easily understand the information.
- b.** Aim for 200-250 words. Using too few words can result in the research not being fully explained or clear to the reader, while using too many words can hinder the infographic's effectiveness by overwhelming the reader.
- c.** Integrate quotations if possible. Due to the qualitative nature of much of the research located within the DTES RAP quantitative data may be limited. Therefore, it can be useful to incorporate quotations into the infographic in place of such data, as they can draw readers in and act as a focal point for the infographic.

### **2. Visual Elements.**

- a.** Ensure the visual elements are relevant. Irrelevant visuals can distract readers and take attention away from the information-based text and visuals. Choosing visuals

that align with the text they are placed near can assist in readability and comprehension and limit misunderstanding.

- i.** Information-based visuals (ex. charts, graphs) that displayed numerical data were well received. If this data is not available due to the qualitative nature of the research, it may be useful to integrate numerical visuals in other ways (ex. listing information using large numerical visuals).
- b.** Consider the placement of visual elements. Overusing visual elements can result in the infographic being overwhelming and difficult to read, therefore it is important to thoughtfully consider where you are placing visuals. Ensure visuals do not interfere with the text or contribute to the infographic being overcrowded.

### **3. Design.**

- a.** Use a simple, clear layout with defined sections. Choose a layout that is straightforward and will not require work from the reader to parse through. Using clear headers to differentiate between the sections of the research article is a useful approach to take when determining the layout of the infographic.
  - i.** Ensure white space is incorporated into the layout.
- b.** Choose a colour palette that features 3-4 complimentary and be consistent in its use. While a variety of colours may be eye-catching, it can be distracting and reduce the overall quality of the infographic. To support comprehension and enhance the attractiveness of the infographic be consistent in the colours used and incorporate them throughout the entire infographic. Additionally:
  - i.** Use a white, or light coloured, background.

- ii.** Keep accessibility in mind when determining the colour palette. To ensure readability for those who may have trouble distinguishing between colours, avoid the following colour combinations: red / green, brown / green, purple / blue, blue / green.
- c.** Use a sans serif font and size the text appropriately according to its function. Be consistent when using a typeface and stick to specific size guidelines. Using one sans serif typeface can help support the overall cohesion of the infographic, while adhering to the following size guidelines will help to distinguish the text's function:
  - i.** 18-30 for headlines.
  - ii.** 10-14 for labels / sub headers.
  - iii.** 8-10 for explanatory / body text.

### Bibliography

- Abilock, D., and Williams, C. (2014). Recipe for an Infographic. *Knowledge Quest*, 43(2), 46-55.
- About. (n.d). Downtown Eastside Research Access Portal. Retrieved September 20 2021, from <https://dtesresearchaccess.ubc.ca/about>.
- Albers, M. (2015). Infographics and Communicating Complex Information. *Design, User Experience, and Usability: Users and Interactions*. 267-276.
- Atalay, S., Bonanno, L., Galman, S., Jacqz, S., Rybka, R., Shannon, J., Speck, C., Swogger, J., and Wolenceck, E. (2019). Ethno/Graphic Storytelling: Communicating Research and Exploring Pedagogical Approaches through Graphic Narratives, Drawings, and Zines. *Multimodal Anthropologies*, 121(3), 769-772.
- Balkac, M., and Ergun, E. (2018). Role of Infographics in Health Care. *Chinese Medical Journal*, 131(20), 2514-2517.
- Barlow, B., Webb, A., and Barlow, A. (2021). Maximizing the visual translation of medical information: A narrative review of the role of infographics in clinical pharmacy practice, education, and research. *Journal of the American College of Clinical Pharmacy*, 4(2), 257-266.
- Burgio, V., and Moretti, M. (2017). Infographics as Images: Meaningfulness Beyond Information. *Proceedings, International and Interdisciplinary Conference*.
- Dunlap, J., and Lowenthal, P. (2016). Getting graphic about infographics: design lessons learned from popular infographics. *Journal of Visual Literacy*, 35(1), 42-59.
- Fendler, L. (2020). An Information Reformation? Research Expertise in a Populist Context. *Journal of Philosophy of Education*, 54(3), 694-709.

- Gareau, M., Keegan, R., and Wang, L. (2015). An Exploration of the Effectiveness of Infographics in Contrast to Text Documents for Visualizing Census Data: What Works? *Human Interface and the Management of Information: Information and Knowledge Design*, 161-171.
- Gay, J., Simms, V., Bond, R., Finlay, D., and Purchase, H. (2019). An Audit Tool for Assessing the Visuocognitive Design of Infographics. *Proceedings of the 31<sup>st</sup> European Conference on Cognitive Ergonomics*, 1-5.
- George-Palilonis, J. (2016). *Designing Infographics. A Practical Guide to Graphics Reporting*. Routledge.
- Hernandez-Sanchez, S., Moreno-Perez, V., Garcia-Campos, J., Marco-Lledo, J., Navarrete-Munoz, E., and Lozano-Quijada, C. (2020). Twelve tips to make successful medical infographics. *Medical Teacher*. <https://doi-org.ezproxy.library.ubc.ca/10.1080/0142159X.2020.1855323>
- Kung, J., and Tsuyuki, R. (2020). Maximizing Impact with Infographics. *Focus on Impact*, 153(4), 208-210.
- Majooni, A., Masood, M., and Akhavan, A. (2017). An eye-tracking study on the effect of infographic structures on viewer's comprehension and cognitive load. *Information Visualization*, 17(3), 257-266.
- Mallett, R., Runswick-Cole, K., and Collingburne, T. (2007). Guide for accessible research dissemination: presenting research for everyone. *Disability & Society*, 22(2), 205-207. <https://doi-org.ezproxy.library.ubc.ca/10.1080/09687590601141683>
- Otten, J., Cheng, K., and Drewnowski, A. (2015). Infographics and public policy: using data visualization to convey complex information. *Health Affairs*, 34(11), 1901-1907.

- Park, S., and Tang, L. (2018). How colour and visual complexity affect the evaluation of skin cancer infographics: an experiment study. *Journal of Visual Communication in Medicine*, 42(2), 52-65.
- Santos, C., Pereira, M., and Neves, M. (2018). The Influence of Infographics in Accessing Information. Multidimensionality in Visual Representation and Configuration of Different Media. *Advances in Ergonomics in Design*, 497-508.
- Yildirim, S. (2017). Approaches of Designers in the Developed Educational Purposes of Infographics' Design Processes. *European Journal of Education Studies*, 3(1), 248-284