Seeing differently: Making R accessible for visually impaired students through collaborative learning design

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This is an experiential rather than research case study of pedagogic practice. In this document, we provide an overview of the resources that were created to help a visually impaired undergraduate student in the social sciences learn introductory statistical analysis. We offer insights into the lessons we learned, the approach taken, and the resources we used to teach statistics without sight and provide what we believe is one of the few attempts to try to explain not only how to teach statistics to a visually impaired student, but also to do so in a way that explains how to integrate the technology blind students rely on to learn statistics and explain how it works in a way that someone not familiar with accessibility software can understand. It also includes a summary by our student Andrew detailing his experience of learning statistics using these resources. Finally, we provide an overview of the resources created and how they can be integrated into wider teaching practice.

Introduction

Arriving at university as a new undergraduate experience can be a daunting experience. Many find themselves living in a new country or city, in an unfamiliar environment, with no developed social networks and needing to learn many life skills associated with living alone for the first time. This represents a significant yet exciting time in a person’s life, but it is not without its challenges, especially for students with visual impairment.

In the 2017-18 academic year, there were 307,975 students who declared a disability while studying for a degree in higher education in the UK [1]. Of those, 3,170 students were registered as visually impaired [2]. A report from HEFCE [3] highlighted that HEIs still have significant progress to make in creating a more inclusive study experience for those with disabilities. One significant challenge for Higher Education Institutions (HEIs) is often a lack of specialist knowledge in relation to specific disabilities, which only becomes apparent when a student arrives. While considerable funds go on student support and well-being at HEIs, there remains a disconnect between those who are able to engage with disabled students and understand their challenges, and academics who have specialist knowledge in their field but not necessarily the expertise to understand what adjustments need to be made—or how to make these adjustments—to ensure courses are accessible to all.

Students with visual impairments face significant challenges in completing tasks. For instance, taking notes during lectures, or participating in group-based assignments [4]. They also face significant challenges navigating resources to support their studies, such as the library or the various IT platforms provided to aid learning [5]. A lack of assistive resources and appropriate technology and concerns about privacy create further barriers to engaging effectively in higher education [6, 7] as well as a lack of readily available study resources specifically designed for visual impairment [8, 9]. A further study highlights the challenges faced due to a lack of effective support services [10], and while university staff do try to support their students a lack training [11] often makes it significantly more challenging to provide appropriate support for visually impaired students.

The challenges of learning statistics

Within the social sciences, one of the most daunting parts of a new curriculum often revolves around learning quantitative research methods. Even for sighted students, the realisation that they must learn statistics through software packages such as R, Stata, or SPSS often provokes anxiety.

Numerous factors help explain social science students' engagement and performance in learning statistics. Performance is heavily predicted by past attainment [12, 13]. Intuitively, this makes sense: while there are obvious differences between more abstract mathematics and the more applied subfield of statistics (depending on how the latter is taught) the two can seem inseparable [14]. However, students' past performances in maths only explain part of the picture. Attitudinal factors surrounding experiences of learning statistics are also crucial to engagement and attainment at university [15]. Student perceptions of the complexity of statistics and their apparent (ir)relevance to the discipline are also significant in predicting success because they help determine the amount of effort students put into learning statistics [16, 17]. A lack of interest in statistics is, naturally, a consistent barrier to learning [18].

Emotional and psychological factors also play a significant role in shaping how students engage with statistics. Among these, 'statistics anxiety' stands out as a particularly influential barrier to learning [19, 20]. This form of anxiety often emerges from earlier negative experiences with mathematics and is sustained by perceptions of statistics as complex or intimidating [12, 21]. Research identifies three main sources of statistics anxiety: dispositional factors linked to personality and emotional tendencies, course-related factors associated with prior experiences and teaching structure, and person-related factors such as age or confidence [22, 23, 24]. Its effects are wide-ranging—students experiencing high levels of anxiety frequently report feelings of stress, frustration, and low self-efficacy [25]. These emotional responses can reduce motivation, limit help-seeking behaviour, and heighten apprehension towards instructors [18]. While scholars disagree on whether anxiety causes poor performance or arises from it, the relationship between the two is clearly reciprocal and self-reinforcing over time [26, 27].

Given that the literature on students with visual impairments highlights the higher likelihood of mental health concerns in higher education [28], it is easy to see that a task daunting for a sighted student could be even more so for a visually impaired student new to university.

It is not only for mental health or social reasons that statistics can be challenging, but also because of the way it is typically taught. There is a heavy reliance on visual tools to make statistical concepts understandable [4, 29. 30, 31, 32]. Equally, the approach to teaching beyond graphs matters a great deal. An over-reliance on equations can become a barrier in terms of the limits of active memory [4]. Instead, a focus on applied statistical analysis may be more appropriate—and, in our opinion, more relevant—particularly within the social sciences.

Our journey teaching statistics to visually impaired students

We have always enjoyed the challenge of teaching statistics to new students and showing them the value it can add to their ability to understand and explore political questions, while also demonstrating that there can actually be joy in the art of statistical exploration. In particular, Adrian Millican spent a significant amount of time during the COVID-19 pandemic thinking about how to best teach statistics in an asynchronous environment, utilising a flipped classroom model, workbook-based approaches, and quizzes as learning checks, alongside lectures introducing new material and hands-on research questions to work through as a group to illustrate the research process as a whole.

When we were first informed that we would be teaching a visually impaired student, however, we experienced a mix of excitement and apprehension. While we relish opportunities to make statistics accessible and engaging, and we saw this as a chance to push ourselves as educators and make a genuine difference, we were acutely aware of our own lack of knowledge about assistive technologies and the practicalities of presenting data in ways that would be meaningful without relying on visual cues. Questions immediately came to mind: How would the student engage with tables and charts, which are so central to statistical reasoning? How could we ensure that they were not disadvantaged in a subject that often assumes visual literacy? These uncertainties were daunting because we wanted to provide an inclusive and equitable learning experience, but we knew we had a steep learning curve ahead.

At the same time, we felt a strong sense of responsibility and curiosity. We have always believed that statistics should not be a gatekeeping subject but rather a tool for empowerment, and this situation challenged us to live up to that belief in a very practical way. It required us to think creatively about pedagogy, to question our assumptions about how students learn, and to explore resources and strategies that we had never previously considered. Looking back, those initial feelings of apprehension were not a sign of reluctance but of care—we wanted to get it right. This experience ultimately became an opportunity for growth, both for us as teachers and for the resources we developed, which we hope will help others facing similar challenges.

The starting point of our journey was to explore what resources already existed to support visually impaired students learning statistics. As with most new endeavours, searches on Google and Google Scholar turned up some useful materials however it was quite noticeable that there was not a great deal by way of resource for teaching statistics to blind students, and even less so in terms of how a sighted individual would engage with a blind student to help them learn. There were however, some very useful resources that did help significantly in guiding the approach we took and helping us to learn about the challenges a blind student would face. In particular, the work of Jonathan Godfrey caught our eye. He has produced numerous valuable resources to support the learning and use of statistics for those that are visually impaired, notably a BrailleR package which helps make R code more compatible with screen readers. Additionally, he co-authored *Advice from Blind Teachers on How to Teach Statistics to Blind Students* [29]. We found particular value in the discussion between former lecturers commenting on engaging and supporting blind students, and the authors' responses as visually impaired educators. The idea of viewing the teacher-student relationship as akin to assisting a student over the phone—where neither can see what is happening—helped us reconceptualise the challenge. Other key considerations included avoiding reliance on lecture slides (a major component of previous iterations of statistics classes) and recognising the need to create simplified ways of representing charts and tables to allow for data exploration. However, the most important lesson learned was that using the same resources as sighted classmates is extremely difficult for a blind student, both in terms of format and content. Godfrey & Loots [29] provide a clear explanation why using the R software was the most appropriate option for visually impaired learners (see also [35]). They provided useful guidance on preparing resources in accessible formats and ensuring that language was appropriate—for example, avoiding terms like *here*, *there*, *this*, or *that*, which rely on visual gestures, and making sure notes were properly structured.

On the basis of the guidance of Godfrey & Loots [29], the resources we have prepared are presented in HTML. We avoided lectures entirely and instead focused on a workbook-based approach that can be digested and revisited at the student's own pace. We made sure that resources were available well in advance of the session (though in this first run, there was naturally some trial, error, and adaptation as we progressed), used software compatible with screen readers, and ensured that our assessments tested appropriate learning outcomes.

Jonathan Godfrey has also gone to great lengths to write an online, freely available book [34] which provides a blind user's guide to learning R. It repeats, in practical steps, many of the lessons learned earlier and provides an exceptionally helpful overview of the BrailleR package, which contains commands to simplify many of the key topics covered in introductory statistics. As Godfrey himself puts it, WYRIWYG (What You Request Is What You Get)—while R has been identified as one of the most accessible statistical programs for blind users, it still produces outputs that are not especially user-friendly (for those familiar with R, consider the lengthy output generated by a simple independent-samples t-test).

One challenge we encountered when engaging with this material was that, as expected given its purpose, it was somewhat difficult to navigate as sighted users. It explored ways of using R that were not commonly used by us and, in essence, required us to relearn how to utilise and engage with statistical software. It intended to cover more than the very basic statistical analyses a new social science student would need, and that complexity gave us some concerns about how best to proceed. What it did do very well, however, was to explore the BrailleR package and provide an overview of the key working methods that needed to be central to our approach.

There was one key area of divergence between our approach and the one advocated in the book. In B*railleR in Action* [34] Godfrey notes that earlier versions of RStudio were not compatible with screen readers, and on this basis, working through Markdown (as recommended via plaintext documents saved as .rmd files) was preferred. However, more recent updates to RStudio—including significant accessibility improvements in 2020 (version 1.3), 2022 (version 2022.12.0), and 2023 following its migration to Electron—have greatly improved screen reader support (https://posit.co/blog/rstudio-2022-12-0-update-whats-new/). Given that our students are accustomed to working within the RStudio environment, and having explored command-based navigation rather than cursor-based navigation, we felt confident this would work (though we did prepare backups in case it did not).

There were also several other important considerations we drew upon in creating the labs. We noted the importance of appropriately describing data patterns and made sure that where figures appear, they are clearly explained [4]. We also limited the use of explicit equations, choosing instead to focus on explaining what statistical concepts and tools are designed to do, how they are used, how they are interpreted, and when they should be applied.

The literature also made recommendations regarding how visually impaired students should work. There is a strong and understandable focus on incorporating cooperative learning, and encouraging blind and sighted students to work alongside each other [35]. While we did not manage to achieve this during resource creation—since we were designing and troubleshooting materials as we went along—we now firmly believe that, with established resources, this could be implemented effectively. The literature also highlights the importance of one-on-one time to enhance learning for blind and visually impaired students, particularly in supporting them through assessment and checking understanding [36, 37]. Although these one-to-one sessions were time-intensive, they proved exceptionally rewarding. The student's consistent preparation and commitment to working through the materials in advance meant that his progress soon outpaced many of his sighted peers. By the time Toth took over the delivery of Labs 4 and 5, she noted that the teaching process had shifted largely from instruction to discussion and clarification. This experience underscored that accessible teaching, when designed with care and dialogue, not only ensures inclusion but can also deepen understanding and foster independent learning.

There is one final point we wish to highlight regarding a development that was not available at the time we created the labs. Fuentes-Balderrama et al. [31] have recently begun beta testing a new R package that simplifies a number of statistical tools for blind and visually impaired users, such as computing and interpreting descriptive statistics, mean comparisons, correlations, regressions, chi-square, and logistic regression, with accessible output formats. This development is worth monitoring, as it has the potential to further streamline the tools we use to make statistics more accessible.

Going about creating the labs

In an ideal world, we would have ensured that all of these resources were available well ahead of time and that we had the confidence to run and test them effectively before the lab sessions took place. However, we knew that, given our own limitations and limited experience of working with computers while visually impaired, as well as the significant learning curve for the student, it would be better to remove this from the main classroom environment in the first instance. As such, we worked separately with the student in one-to-one tuition to facilitate learning for both of us. We would describe our approach not as one of student and teacher, but as a shared partnership in tackling a new challenge—for us, learning to think and operate without sight; and for the student, learning to code, which, as previously mentioned, is a significantly daunting skill even for sighted students in the social sciences.

We started with our existing lab resources as a first point of consideration. The basic structure of the five-lab series we run includes the following sessions:

1. Introduction to R and the RStudio environment, descriptive statistics
2. The basics of probability and inference
3. Independent samples t-tests
4. Chi-square (χ^2) tests
5. Correlations

The original module's approach centred on a flipped classroom model. Students watched pre-recorded lectures and used a workbook containing all the commands from the lectures, accompanied by practical illustrations. Afterward, they attempted further questions through a homework and a formative quiz, which we would then discuss during a live lab session. Students were also provided with full answer keys and a variety of "cheat sheets" designed to support their learning.

The first step was figuring out how to support a visually impairment student in installing R and RStudio. Millican was of the opinion that simply installing it ourselves for them would not aid future development, so he taught himself how to use his Mac as a blind user—how to locate the necessary downloads, install them, and activate the accessibility tools built into later versions of RStudio. This was perhaps the most challenging part. Millican spent a significant amount of time navigating his own Mac using the screen reader in an attempt to understand how to move between windows and access different menus within the software. This proved to be invaluable experience, and we have outlined how this works in the first lab materials, available under the “Installing R” section (see also the Accessibility Commands Cheat Sheet).

Once we had figured out how screen readers work and ensured that R and RStudio could be installed independently, the next stage was to critically examine the resources we usually rely on and determine what would and would not work. One of the issues we identified was that the pre-recorded lecture videos used in the original module were inaccessible for a blind or visually impaired student, as they relied heavily on visual slides and on-screen demonstrations without verbal description. To address this, we decided to integrate the video component into the workbooks, with expanded written explanations that could be accessed independently with a screen reader. This adaptation not only improved accessibility but also prompted us to think more deliberately about how to communicate statistical processes verbally and sequentially rather than visually. Additionally, carefully considering which graphics (if any) were necessary and how they could be presented accessibly was a critical part of this process. Our aim in developing these resources was to create materials that we could use again in the future, make widely available, and ensure that we were able to incorporate teaching visually impaired students within the main labs. We reflected extensively on how, in an ideal world, this integration would have happened from the beginning. However, given the trial-and-error nature of creating these resources, it would have been unfair on all students to experience this process simultaneously. By designing materials that could later be integrated alongside standard lab activities, our aspiration is to fully embed this approach in future classes.

Subsequently, we divided the work on the project, with Millican developing the first three labs and Toth producing Labs 4 and 5, as well as the formative quizzes. The first lab needed to cover the basics, such as exploring the commands used to navigate the RStudio environment, discussing different file types, and introducing a variety of basic commands. However, there were challenges to address even before reaching the point of opening the statistical software. One of the most common difficulties for students learning statistics is simply engaging with a computer and understanding basic file management concepts, such as working directories. In a generation that has grown up using tablets and smartphones, the idea of understanding how files are stored can be daunting. At this stage, much of the practical development work was led by Millican, who had failed to understand the challenges of navigating file structures – having grown up using Windows 3.1 as his first PC experience (a horrifying clue into his age!) – until he had to do so non-visually. Indeed, learning how to navigate and record working directories so that a blind student could effectively create a place to store all of their code and analysis became a major hurdle.

In Section 1.8 of Lab 1, the instructions explain how to do this on a Mac (the supplementary Accessibility Commands Cheat Sheet also contains commands for both Windows and Mac). Alongside this, the lab provides detailed instructions on how to load data, save files, and access analyses. Two approaches to engaging with statistical output are explored: one using the sink command to export results into a text file, and another using Quarto. In the end, the student preferred the Quarto approach because it was easier to navigate the HTML output and allowed for more effective notetaking during analysis.

Once the basics of using R and navigating RStudio were established, the lab moved on to explore descriptive statistics. A range of base R functions was employed, as well as other commands that worked well with screen readers. In particular, the descriptives command from *jamovi* performed very well with a screen reader, providing information in a plain-text format that was easy to interpret. We also employed the *BrailleR* package to explore how a visually impaired person might engage with graphical representations of statistical outputs. Using the *VI* command from BrailleR, we generated written descriptions of histograms and boxplots—and the clarity of the spoken descriptions was such that one could easily visualise what was being shown.

This was perhaps the most difficult lab to design and teach. Learning R has a notoriously steep learning curve, and that was certainly true here. There was a considerable amount of trial and error involved – Millican made at least four rounds of revisions to ensure that everything worked properly with the screen reader and to troubleshoot various issues. However, the early work invested in making sure the technology functioned smoothly and that output could be accessed effectively gave both the student and the teaching team confidence that progress could continue successfully. Overall, this iterative process proved invaluable, placing both parties in a strong position to move forward with confidence.

The second lab moves on to explore the basics of probability. Much of the code is familiar from the previous session, meaning that the jump in coding expertise required is considerably smaller. A few new commands are introduced, focusing primarily on data management (e.g. *sample(), filter(), and set.seed()*). The greater challenge in this lab lay in finding ways to explain the concept of the normal distribution without relying on visuals. Typically, the central limit theorem would be demonstrated through histograms, and while commands such as *VI* can provide text-based descriptions of these, we found that the same concept could be conveyed by examining repeated samples and comparing individual means with a hypothetical population mean. On this basis, we felt confident in explaining what the normal distribution is, how it works, and how it underpins our ability to interpret statistical information in the social sciences.

The third lab introduces the practical application of inference through independent-samples t-tests, again building on the code developed in Lab 2. The new material focuses on two approaches to running a t-test—using *ttestIS* from the *jamovi* package (which provided a more accessible and simplified output) and the base R *t.test()* command. Several specific commands proved especially helpful in this lab, particularly the use of the *VI* command to generate written descriptions of boxplots. This tool was invaluable for explaining the distribution of a numeric variable across two categories and for illustrating how and when a t-test is likely to produce a significant result—and what that significance means in practical terms.

From Lab 4 onwards, the design and materials were led by Toth. The fourth lab focused on contingency tables and chi-square tests as tools for analysing relationships between two categorical variables, while also revisiting the logic of hypothesis testing. A key challenge here was that crosstabs can quickly become overwhelming for a screen reader user when variables have many categories. To address this, we deliberately built in data management steps using *mutate(), recode(), and droplevels()* to simplify factor variables and reduce the number of categories to an interpretable set. These decisions were driven as much by accessibility as by statistical good practice: fewer, well-chosen categories make both the analysis and the narration of results more manageable. The lab was also structured to foreground interpretation rather than calculation. Using *contTables*() from the *jamovi* package, the emphasis is placed on how to read the tables aloud effectively, paying attention to row and column percentages and to what these suggested about possible relationships. The chi-square output was presented as a natural extension of this descriptive work: once the student understood the pattern of percentages across countries, the chi-square statistic and p-value were framed as tools to decide whether those differences were likely to have arisen by chance. Where graphs were used—such as stacked bar charts produced with *ggplot*()—the workbook relies on BrailleR's *VI* function to provide textual descriptions, reinforcing the same patterns already discussed in the tables rather than introducing new visual information that would be inaccessible.

The fifth lab turned to correlations as a method for examining relationships between two numeric variables. This lab built directly on the principles of hypothesis testing introduced earlier, extending them to situations where both variables were continuous. The focus was on interpretation rather than formulae, helping the student understand how to assess direction, strength, and significance. The workflow again relied on *Quarto* and *BrailleR* outputs to ensure accessibility, and introduced only a small number of new commands, such as *corrMatrix()* from *jamovi* and *cor.test()* from base R.

Designing Lab 5 also required us to confront the limits of non-visual analysis for scatterplots. Sighted teaching often leans heavily on scatterplots with fitted lines to diagnose linearity, but *BrailleR* currently cannot fully convey the shape of a lowess curve in a way that allows blind users to make independent judgements. As a result, we adopted a numerical workaround: computing both Pearson's *r* and Spearman's rho and comparing their values to decide which measure was more appropriate. Alongside this, we made substantial use of *BrailleR's VI* descriptions of boxplots to motivate decisions about outliers and recoding, illustrating, for example, how extreme values could inflate correlation coefficients and distort substantive conclusions. By the end of the lab, the student was able to run and interpret correlation analyses independently, demonstrating that even conceptually visual topics can be taught effectively through non-visual, text-based methods.

In addition to the lab activities, the module also incorporated formative assessments originally designed as multiple-choice quizzes hosted on Blackboard. For the blind student, however, there were concerns about how effectively the screen reader could navigate this format, particularly where code snippets or graphs were embedded in the questions. To ensure full accessibility, Toth downloaded each quiz, reformatted it into a plain text (.txt) document, and adapted or replaced any items that relied on visual interpretation so that they could be read and answered non-visually. The student then completed the quizzes independently and returned their responses by email, after which feedback was provided manually on any incorrect answers. This process worked well on a one-to-one basis, offering opportunities for personalised clarification, though it was time-intensive. In hindsight, it would be feasible—with sufficient time and institutional support—to create an automated version of these accessible quizzes, mirroring the Blackboard format used by sighted students while providing instant feedback through a screen-reader-compatible platform.

Practical lessons for teaching statistics accessibly

Try using a screen reader yourself

One of the most valuable steps we took early on was learning to use a screen reader ourselves. These tools are easy to activate—particularly on a Mac—and doing so helped us understand what navigating RStudio non-visually actually feels like. At first, we even covered the screen with a tea towel to remove the temptation to glance visually while testing commands. This exercise revealed just how different the experience is: reading long outputs line by line, managing multiple windows, and keeping track of where you are in the code. For any first-time teacher supporting a visually impaired student, we strongly recommend this practice. It builds empathy, confidence, and a practical awareness of accessibility barriers that can't be grasped from documentation alone.

Don't be afraid to experiment

As in all statistics teaching, there was a fair amount of trial and error involved in creating accessible materials. Finding the best way to introduce difficult concepts takes time, and not every attempt will work perfectly the first time. We learned to approach this process collaboratively—with the student—by treating each challenge as an opportunity to learn together. Our experience confirmed that flexibility, openness, and a willingness to adapt are key. If we were able to build this from scratch, others can too.

Design for inclusion from the start

With the resources we have now developed—particularly the HTML workbooks and accessible exercises—we believe it would be entirely possible to teach sighted and visually impaired students together. The same datasets, exercises, and analyses work equally well for both groups, supporting full social inclusion and engagement. The experience has convinced us that accessibility does not need to be a separate or parallel process; it can and should be embedded within the standard teaching design.

Support students with clear codebooks

An unexpected but important lesson was the difficulty of navigating codebooks. Many were inconsistent or used variable names that did not exactly match those in the dataset, making it challenging for a student relying on a screen reader to locate the right information. Providing clear, standardised, and accessible codebooks is therefore essential. Even small improvements—such as aligning variable labels and simplifying layouts—can make a substantial difference.

Accessible teaching benefits everyone

Perhaps the most powerful lesson was that accessibility improves learning for all students. Working one-to-one with our visually impaired student showed that inclusive design fosters deeper understanding, independence, and reflection. The student's careful preparation and commitment soon led to mastery that surpassed many of his sighted peers. By the later labs, teaching had shifted from instruction to discussion—a testament to the fact that accessibility is not just about removing barriers but about enhancing the overall quality of learning.

My journey as a student learning statistics, Andrew Hamilton

Going into the computer labs, I was honestly quite nervous both in terms from past experiences trying and failing for years to work with computer programming languages and from an accessibility perspective regarding how statistical analysis in R would work with my assistive technology i.e. screen reader and dictation software.

I continued to feel nervous and albeit at times frustrated until a few meetings in with Dr Millican, as we initially had to figure out how to ensure compatibility and an efficient workflow between R studio and my assistive technology.

The turning point for me was really after the theory section of lab 1, when I was tasked to complete the homework tasks through independent study. As mentioned earlier, the intuitive layout and structure of the lab notes, turned nervousness into excitement and curiosity as I realised that I was understanding not only the theory behind the methods but how to use R in statistical analysis. I also gained confidence quite quickly to not only complete tasks but to read syntax errors and even experiment on my own to see how I could manipulate R to get different statistical outputs.

In terms of what knowledge I would have liked beforehand to make the labs more manageable, I'd say there wasn't really a single piece of knowledge that I didn't have from the beginning, I'd say the most valuable piece of knowledge is to not only have. but get used to. the most common shortcuts that you would use as a screen reader user to orient and navigate around RStudio. As knowing how to confidently and efficiently navigate RStudio, for me made it a lot less nerve-racking process and allowed me to focus on the lab's theory and content. Apart from that, the labs deliver the content and theory step by step, comprehensively ensuring you have all the knowledge to use R for statistical analysis.

I'd be really interested in helping co-author a journal article on this, both that I genuinely enjoy using R and from the perspective of learning along the way the process of writing and putting together research articles. I would be keen and really interested to undertake this.

The computer sessions introducing R as a method of analysis for quantitative as Part of the Level 1 Undergraduate module Researching politics and International Relations module, originally delivered through 5 fortnightly online lab sessions, had to be adapted to be accessible to me as a student who is a screen reader user due to being visually impaired.

Dr Adrian Millican, Dr Fanni Toth and the Department not only conducted the lab sessions in an alternative mode through one-to-one in person tuition, but undertook extensive research and put in numerous hours to ensure my assistive technology not only able to work with R studio, but that I was able to perform and access the data from the various statistical methods that were taught such as t tests, spearman's rank corelation etc as due to the default output often being visual through graphs and charts. This involved often using niche plugins that had been developed by VI/blind users and academics without robust documentation meaning that for the labs, a bespoke set of materials needed to be developed to instruct me in how to overcome the challenges and difficulties that the standardised commands for such statistical methods would have posed for me as a VI politics student.

The labs were delivered in a way that was intuitive and comprehensive with each lab building on the previous lab, which allowed me to effectively pick up the fundamentals in statistical analysis. With the lab materials taking me step-by-step through the required theory and then getting me to complete practice exercises. and this gave me the confidence that extended into my independent study and completion of homework and practice tasks as the materials were an invaluable asset for when I got stuck on problems or when I needed to troubleshoot syntax errors, in addition to the support provided by Dr Milican and Dr Toth in the labs and over email.

The plain text format also really enhanced the workflow as I relied on text files to read various outputs from R in an accessible manner. All of these elements combined meant that I found the final summative statistical exercise quite enjoyable, as I got to use my preferred statistical methods to explore a research question and dataset of my choosing. Overall the adapted statistical computer labs, allowed me to achieve the learning outcomes the same as my peers, whilst conveyed the knowledge of how to effectively R and statistical methods in an accessible manner, which will undoubtedly be invaluable for me going forward with my studies and degree programme.

Conclusion

This project has been both an interesting and immensely valuable experience. It undoubtedly brought moments of stress and uncertainty for everyone involved, but also a great deal of satisfaction and pride as we worked through the challenges together. The process required us to rethink many of our assumptions about how statistics can and should be taught, and it ultimately transformed not only our approach to teaching but also our understanding of what accessibility truly means.

What began as an effort to support one visually impaired student evolved into a broader reflection on inclusive pedagogy, collaboration, and creativity in higher education. We learned that accessible design benefits all learners and that, with thoughtful preparation, it is entirely possible to teach complex statistical concepts without relying on visual materials. We also discovered that accessibility is not a technical afterthought but a way of reimagining learning environments so that every student can participate fully and confidently.

We hope that the resources and reflections presented here will make what can be a challenging journey in teaching statistics a little easier for others embarking on similar paths. Accessibility is a shared responsibility, and progress comes through community effort and exchange. We therefore welcome any comments, suggestions, or adaptations from colleagues who wish to build on this work and continue improving how we teach statistics—both with and without sight.

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This case study is part of a series produced from the NCRM Pedagogy Network. Look out for them on the NCRM website. We also appreciate feedback to inform future work.

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To cite this paper: Millican, A.S., Toth, F. & Hamilton, A. (2025) Seeing differently: Making R accessible for visually impaired students through collaborative learning design (Case Studies in Research Methods Pedagogy). National Centre for Research Methods.