

# **University students with dyslexia: A qualitative exploratory study of learning practices, challenges and strategies**

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## **Abstract**

**Introduction.** People with dyslexia are vastly under-represented in universities (Katusic et al., 2001, Richardson & Wydell, 2003; Stampoltzis & Polychronopoulou, 2008). This situation is of concern for modern societies that value social justice.

**Aims.** This study was designed to explore learning experiences of university students with dyslexia and factors that could contribute to their success.

**Methods.** Thirteen students with dyslexia and twenty non-dyslexic peers were interviewed about their university learning experiences using a semi-structured qualitative approach.

**Results.** Students with dyslexia described engaging in learning activities intensively, frequently and strategically. They reported challenges and strengths relating to study skills, lectures, assessments, technology and support services. They also described helpful strategies including self-directed adaptive techniques, provisions from lecturers and assistance from the university.

**Conclusions.** These findings suggest that students with dyslexia experience broad challenges at university, but helpful strategies may be available.

## **Key messages:**

- Students with dyslexia described working intensively and strategically at learning tasks.
- They reported numerous learning challenges and strengths, especially regarding note-taking, auditory and visual distractions, course readings, technology and written assessments.
- Helpful strategies may include adaptive note-taking techniques, minimising auditory and visual distractions, choice of lecture formats, print-on-demand course readers, new assessment modalities, tailored support services, and training.

**Key words:** Dyslexia, adults, higher education, university, study skills, learning, support

## **Introduction**

Dyslexia is a common learning difficulty, affecting 4-12% of the general population (Katusic et al., 2001), but research indicates that representation in universities may be much lower. In a UK-based study, only 0.48% of university students reported reading difficulties (Richardson & Wydell, 2003), and in a Greek study, only 0.16% (Stampoltzis & Polychronopoulou, 2008).

Equitable educational access is a moral and humanitarian imperative, and this is enshrined in legislation in many countries (Elkins, 2000; Hall & Belch, 2000; Nunan, George & McCausland, 2000). It is therefore important to identify factors that could contribute to poor representation and experiences of dyslexic students in higher education and seek appropriate solutions.

Regarding overall academic achievement of university students with dyslexia, Olofsson, Taube, and Ahl (2015) found that approximately one fifth of Swedish university students with dyslexia required additional time to complete their degrees, but others were able to progress at a normal pace.

Similarly, Richardson and Wydell (2003) reported that among dyslexic students in UK higher education who completed their degrees, approximately 40% obtained first-class or upper second-class honours – an indication of ‘good’ degrees in the UK system. This was lower than the rate of approximately 50% for students with no reported disabilities. These results suggest that success in higher education is not impossible for students with dyslexia, but may be more difficult.

### **Defining dyslexia**

Research in this area is complicated by difficulty defining ‘dyslexia’. Most agree that it involves reading ability below that of age and IQ matched peers, not attributable to poor visual acuity or inadequate instruction (Australian Dyslexia Association, 2007; British Dyslexia Association, 2007; Tunmer & Greaney, 2010). However, there is considerable debate in the education and neuroscience literature regarding underlying causes, age distribution and appropriate assessment methods (Elliot & Grigorenko, 2014).

A key misconception is that dyslexia is a childhood difficulty (Snowling, 2000; Tunmer & Greaney, 2010). This view fails to acknowledge the growing literature describing the lived experiences of adults with dyslexia (McNulty, 2003; Tanner, 2009; Bell, 2010; McLoughlin & Leather, 2013). It also contributes to difficulty determining appropriate diagnostic criteria for adults.

### **Cognitive skills for university study**

Many studies of university students with dyslexia have focused on cognitive skills that contribute to academic tasks such as reading, writing, mathematical calculations and general learning. Studies of reading skills found an overall pattern of dyslexic university students experiencing difficulty drawing inferences from complex text (Simmons & Singleton, 2000). However, other reading characteristics varied widely between students (Erskine & Seymour, 2005).

Studies of the writing skills found dyslexic students had particular issues with spelling (Sterling et al., 1997; Connelly et al., 2006; Mortimore & Crozier, 2006; Callens, Tops & Brysbaert, 2012; Galbraith et al., 2012), overall text quality (Galbraith et al., 2012; Connelly et al., 2006), text length (Sterling et al., 1997), essay organisation (Mortimore and Crozier, 2006) and vocabulary choice (Sterling et al., 1997). There were no major differences compared to peers with regard to sentence structure or length (Sterling, et al., 1997), idea expression or other higher order skills (Connelly et al., 2006).

Key studies into mathematical skills revealed general mathematics anxiety (Jordan, McGladdery & Dyer, 2014), difficulties with multiplication (Callens, Tops & Brysbaert, 2012) and difficulties multi-staged mathematical equations (Perkin and Croft, 2007) among dyslexic students.

Studies into other cognitive skills reported difficulties with concentration, listening, organisation and memory (Mortimore & Crozier, 2006; Olofsson, Ahl and Taube, 2012; Olofsson, Taube & Ahl, 2015).

### **University experiences and strategies**

To date, very few studies have explored day-to-day learning experiences of university students with dyslexia. A considerable body of literature (Fuller et al., 2004; Goode, 2006; Collinson & Penketh, 2010; Gibson & Kendall, 2010; Hutcheon & Wolbring, 2012) has explored overall university experiences of students with a broad range of disabilities, including some data regarding students with dyslexia. These studies reported difficulties with physical access, social stigma, and access to reasonable adjustments. They also described student resilience in ‘managing’ disabilities in the

university context. However, findings regarding dyslexic students are difficult to differentiate from other findings of these studies.

Regarding university experiences of students with dyslexia in particular, Pino and Mortari (2014) conducted a systematic review of published research. They found fifteen relevant studies, from which they synthesised five key themes: student coping strategies, being identified as dyslexic, interaction with academic staff, accessibility and adjustments, and use of assistive technologies and learning technologies. They listed numerous sub-themes within each major theme. For example, coping strategies included study skills, compensatory strategies, help from family and friends, meta-cognitive skills and meta-affective skills. These sub-themes were then further broken down.

Study skills included making notes from books, accessing materials in multiple formats, colour-coding, concept mapping and discussing ideas verbally. Compensatory strategies included downloading lecture slides prior to lectures, obtaining copies of lecture notes and making lecture recordings. Metacognitive skills included time planning and essay diagrams. Despite such extensive review of the available literature, the authors concluded that there are still major evidence gaps in this area, especially regarding strategies for improvement.

Other research into the learning experiences of university students with dyslexia found that they experienced difficulties identifying main ideas in text, preparing for tests (Kirby et al., 2008), reading course books and taking notes (Olofsson, Ahl & Taube, 2012). Key compensatory strategies included use of study aids, time management strategies, deep learning approaches (Kirby et al., 2008) and additional information from the internet (Olofsson, Ahl & Taube, 2012). The authors of these studies concluded that more research is needed into study practices and opportunities for support.

Also of note are findings regarding availability and uptake of services for students with dyslexia. Strong uptake was reported for resources such as additional time in examinations, dyslexia support tutors and information technology assistance (Mortimore & Crozier, 2006; Olofsson, Ahl & Taube, 2012). Further needs included provision of appropriately skilled note-takers, availability of lecture slides in advance, assistance with organisation and support with academic writing (Mortimore and Crozier, 2006; Olofsson, Ahl & Taube (2012)). These findings suggest considerable opportunities for further contributions in this field.

## Aims

The current study builds on this literature, focusing on day-to-day lived learning experiences of students with dyslexia. The purpose was to explore perceptions of dyslexic students regarding their study practices, challenges and helpful strategies.

In particular, it addresses the following questions:

- What are the study practices of university students with dyslexia?
- What challenges and strengths do they experience with their learning tasks?
- What strategies or adjustments do they perceive as helpful?

## Methods

This study employed a semi-structured qualitative interview design supported by Likert-scale questions. This design was chosen because qualitative inductive research allows development of theories about phenomena that have not been thoroughly investigated (Johnson & Christensen, 2012). The addition of quantitative data enables development of integrated knowledge that can inform theory and practice (Johnson & Christensen, 2012). The current paper predominantly reports the qualitative findings.

## **Participants**

Participants were recruited via email invitations to students with a research participation requirement for course credit and those registered with the university's disability service. Advertisements were also posted on campus noticeboards. Participants were provided with verbal and written information about the study, and gave written consent. Where course credit was not required, participants were reimbursed \$15 for their time.

Students were categorised dyslexic if they had a prior diagnosis of dyslexia and/or scored one or more standard deviations below the mean on the Castles and Coltheart 2 for Adults (CC2A) reading test (Castles et al., 2009; updated for use in adults by Badcock et al., n.d., in preparation). This test involves reading single words presented on a computer screen. It contains 165 words of varying lengths and complexities, divided equally across three subscales: 1) regular words, 2) irregular words, and 3) non-words. Responses were recorded and double-scored.

A total of 13 students with dyslexia (Average age 26.3 years; Female n = 7) and 20 non-dyslexic peers (Average age 21.95 years; Female n = 17) were recruited. This small number of participants is appropriate for an exploratory qualitative study. Of the students in the dyslexic group, 11 self-reported a pre-existing diagnosis, of whom 6 also fulfilled the CC2A criterion.

The researchers incorporated data from a further 2 students in the dyslexic group based on reading test scores and patterns observed in their qualitative data. The peer comparison group was included to provide an early indicator of whether emerging patterns might be specific to dyslexic students or apply to the broader student population.

All participants had enrolled in undergraduate degree programs across the humanities, sciences, finance, law, media studies and fine arts. One dyslexic student was enrolled in off-campus mode, while all others were on-campus students. Most participants (n = 27) were in their first year of study, two in second year, one in fifth year of part-time study, one deferred to do an intensive study skills course, and two recently graduated.

## **Procedure**

Individual, face-to-face, semi-structured interviews were held, each taking approximately 40 minutes. Interview questions were based on best practice methodologies, exemplified by Griffin and Pollak (2009) Borland and James (1999) and Holloway (2010). See **Appendix 1** for interview schedule. Questions were designed to elicit rich qualitative data regarding university learning experiences, including challenges, strengths and helpful strategies.

Interviews were conducted by a researcher with dyslexia, in keeping with the empowerment ideals of the equity and diversity literature, as exemplified by Charlton (2000) who discussed the importance of people with disabilities designing and conducting research about people living with those disabilities. The potential for interviewer bias was controlled by input from two non-dyslexic co-researchers.

## **Data analysis**

Written interview notes were checked and expanded from audio recordings, then segmented and thematically analysed using open coding and axial coding, as described by Johnson and Christensen (2012). The analysis was primarily conducted by the researcher with dyslexia, and emergent themes were checked and adjusted by the non-dyslexic researchers to control bias.

## **Results**

Almost all students reported attending face-to-face lectures, listening to recorded lectures, taking notes, reading text books and journal articles, writing assignments, giving class presentations, revising for exams and sitting exams. The following patterns emerged regarding how students with dyslexia participated in these activities, including challenges, strengths and strategies perceived to be helpful.

## **Difficulties taking lecture notes**

Students with dyslexia expressed particular difficulty taking lecture notes. For example, one said:

*“The hardest part for me has been learning how to note take. It’s taken me a year and a half of fumbling about with different formats to finally find something that actually sinks in.”* – Dyslexic student, age 37, 1st year

Two students with dyslexia stated that they were completely unable to listen to the lecturer and write notes at the same time, both saying that they would just listen during the face-to-face lecture without writing any notes, and then write notes later from the recorded lecture. By contrast, very few of the non-dyslexic students expressed difficulty taking notes, almost all describing simple note-taking processes and minimal additional post-lecture work to complete their notes.

Students with dyslexia described numerous strategies for taking notes. For example:

*“I take notes by writing each idea in a small box and drawing arrows from each box to the next, and it actually works for me, and I can read my notes back later”* – Dyslexic student, age 37, 1st year

*“I re-write all my lecture notes using pictures and diagrams. I can’t [read] bullet points”* – Dyslexic student, age 36, graduated

*“I divide my page into two columns when I’m note-taking, and in the main section on the left I write what the lecturer says, and in the thinner column on the right I put my thoughts and connections and any questions I want to ask.”* – Dyslexic student, age 19, 1st year

Some dyslexic students also reported recording the lectures on a mobile phone or tablet, and using programs such as AudioNote or OneNote that make time-stamped recordings and then replaying parts or all of the lecture to fill in gaps in notes.

Three students with dyslexia (23%) and two non-dyslexic peers (10%) stated that it was helpful when lecturers made their slides available to download, especially before the lecture. This enabled students to print and read the slides prior to the lecture and use them during the lecture to add notes to. One student with dyslexia stated that it was especially helpful when lecture slides or notes were made available in Microsoft PowerPoint or Word format rather than PDF, so they could be more easily manipulated. Only 1 of the 13 students with dyslexia received a note-taker from the university’s disability service.

## **Appreciation for face-to-face lectures**

Students with dyslexia indicated strong appreciation for face-to-face lectures and other learning interactions:

*“I enjoy coming and listening to lectures on campus. I feel more confident if I’ve listened to lectures in person.”* – Dyslexic student, age 19, 1st year

*“In a subject where there was good face-to-face interaction I got a high distinction, but my average marks in the others were passes and low credits.”* – Dyslexic student, age 36, graduated

One student with dyslexia was enrolled in off-campus mode and did not attend face-to-face lectures. This student still expressed appreciation for face-to-face learning interactions such as evening tutorials and practical sessions.

The key advantage of face-to-face lectures described by students with dyslexia was the ability to access visual, auditory, and non-verbal cues simultaneously:

*“If there are face-to-face lectures I tend to go to them, but some courses just have recorded lectures, which I don’t feel I learn as well from. It’s a lot better when you see the lecturer’s mouth moving, eye contact, and that kind of physical presence.”* – Dyslexic student, age 20, 2nd year

Both dyslexic and non-dyslexic students found it difficult to concentrate in face-to-face lectures that extended for 2-hours or more. One dyslexic student also described difficulties following the course content when the lecture and tutorial weeks did not coincide.

### **Difficulty following lecture slides**

Students indicated that PowerPoint slides were used in almost every lecture, and were generally helpful. However, students with dyslexia sometimes found them difficult to follow. They described strategies such as reading the lecture slides before class, or just listening in class and ignoring the slides:

*“There’s always a PowerPoint, but I generally don’t even acknowledge the PowerPoint, I just look at my notes and at the teacher. If I try to look at the screen too, then there’s too much happening and I lose track of what’s going on.”* – Dyslexic student, age 37, 1st year

*“The slides are generally a lot of words, which I almost never read”* – Dyslexic student, age 28, 1st year

Students with dyslexia also found certain formats helpful:

*“It’s good when they have less information per slide, just one point on a slide and then explain it, so that my attention doesn’t divert to other points on the slide.”* – Dyslexic student, age 20, 2nd year

*“I engage a lot more with the pictures and the videos, I seem to absorb a lot more information that way.”* – Dyslexic student, age 28, 1st year

One student also mentioned that it was helpful when the lecturer used a paper projector to draw diagrams in real time while also explaining them verbally.

### **Managing auditory and visual distractions in learning spaces**

Both dyslexic and non-dyslexic students commented on auditory and visual distractions in lecture theatres and other learning spaces:

*“It’s hard to concentrate when students are chatting, especially whispering while the lecturer’s talking, the sound travels right through the room.”* – Dyslexic student, age 37, 1st year

*“There were lots of distractions from other students talking, on their phones, playing games on Facebook or moving round, and most lecturers are pretty relaxed about that.”* – Non-dyslexic student, age 19, 1st year

Dyslexic students also stated that they needed a quiet space free of distractions for other study tasks such as watching recorded lectures and reading. For example, at home in a quiet room or in the university library using headphones. Others stated that they needed soft music, ambient noise or small group discussion in order to study effectively.

To manage distractions in the lecture theatre, students with dyslexia described choosing their seats very carefully. For example:

*“In my face-to-face lectures, I sit at front to the right. I don’t know why but that seems to work for me.”* – Dyslexic student, age 37, 1st year

*“Usually I'll get a seat in the first four or five rows, not right up the front unless it's the only seat available.”* – Dyslexic student, age 41, 5th year, part-time

To minimise distractions while working at home or in the library, they described closing doors, adjusting lighting, and wearing headphones to either block out noise or play soft music. Some students felt that lecture room etiquette should be enforced more strictly but recognised that this would be difficult.

### **Appreciation for engaging speaking style**

Both dyslexic and non-dyslexic participants commented on the importance of engaging speaking style. For example:

*“It purely comes down to the style of the presenter for me. It's helpful if I enjoy them, and I enjoy them if they're engaging and interesting and knowledgeable.”* – Dyslexic student, age 28, 1st year

*“I find it particularly helpful if the lecturer is really into what they're talking about, has spent a lot of time in the field and knows their stuff.”* – Non-dyslexic student, age 19, 1st year

Students who expressed difficulties with speaking style generally felt that lecturers and tutors should be provided with more training and support, including direct instruction in public speaking and opportunities to practice these skills and receive peer feedback.

### **Convenience and challenges of recorded lectures**

Both dyslexic and non-dyslexic students appreciated the convenience of recorded lectures. Key benefits were the ability to listen at convenient times and replay difficult sections:

*“[Online lectures are] really useful because I can listen multiple times and re-check stuff.”* – Dyslexic student, age 19, 1st year

Some students with dyslexia particularly appreciated recorded lectures and reported routinely watching or listening to them in addition to face-to-face lectures:

*“I use the recorded lectures to re-listen to the face-to-face lectures.”* – Dyslexic student, age 28, 1st year

Non-dyslexic students, on the other hand, rarely mentioned re-listening to lectures they had already attended, only doing so if there was a specific need such as very complex content, or for exam or assignment preparation.

Despite these important benefits and uses, students with dyslexia also described difficulty with recorded lectures. Indicative quotes include:

*“I find recorded lectures the single most challenging thing at university. Listening to a person talking over a screen of text and having drop-down boxes and animation appear I find really challenging, it just doesn't work for me.”* – Dyslexic student, age 37, 1st year

*“It may take me 2 hours to go through a 1-hour lecture online, or longer, depending on what's in it.”*  
– Dyslexic student, age undisclosed, graduated

One dyslexic student had not listened to any recorded lectures due to technical difficulties accessing and playing them online. Others commented on technical quality of the recorded lectures:

*“The quality of the recordings was often bad. With some of them the sound quality was so bad that I couldn't hear it, and I complained four times but no one corrected it.”* – Dyslexic student, age undisclosed, graduated

Another major issue with recorded lectures seemed to be the format of the recordings, especially whether they included a video of the lecturer speaking. Students described four main formats:

- Audio podcast only, with no video or PowerPoint files
- Audio podcast and PowerPoint slides as separate files
- Video of the PowerPoint slides with audio of the lecturer's voice
- Video of lecturer speaking, including image and voice of lecturer and screen capture of PowerPoint slides or other programs.

All students who had experienced the final format in the above list, including a video of the lecturer speaking next to the slides, stated that they preferred and learnt more effectively from it. Students with dyslexia expressed particular interest in this format, due to perceived benefits of facial and gestural cues.

Students with dyslexia used various strategies to overcome difficulties with recorded lectures:

*"I go to as many [face-to-face] lectures as I possibly can."* – Dyslexic student, age 41, 5th year, part-time

*"I listen to each lecture a few times. The first time I'd just listen to it while I was cleaning or driving or doing something, then the second time I'd listen to it and write out the notes, and then I'd go back and re-write the notes with pictures so I can remember them better."* – Dyslexic student, age 36, graduated

*"I organised to go to extra pracs and tutorials."* – Dyslexic student, age 41, 5th year, part-time

Students who expressed difficulties with recorded lectures felt that lecturers could benefit from training in video technology and recording tips. Suggestions included repeating questions asked by other students in recorded lectures prior to answering the questions, and providing a written transcript for each lecture.

### **Technical issues**

Overall student attitudes to technology seemed positive, but technical difficulties caused frustration, especially for those with dyslexia. Key difficulties related to audiovisual quality of face-to-face and recorded lectures and online access to recorded lectures. An indicative quote from a dyslexic student was:

*"Some lecturers aren't savvy with technology, which is fine because different people have different capabilities, but it wastes time. I think that perhaps there wasn't much training for everybody when they first brought in the system, so that can sometimes be a bit frustrating both for us and for them."*  
– Dyslexic student, age 19, 1st year

Some dyslexic and non-dyslexic students also experienced difficulty using the university's online learning management system and internet to view or download recorded lectures. Key difficulties included finding the correct files, downloading or streaming files, and internet speed and reliability.

Some students reported circumventing some of these difficulties by downloading files at home or work. Others downloaded audio files only and missed the benefits of video. Many reported seeking help from friends or family members. A student who described extreme difficulties in this area had chosen to defer formal studies for a semester to undertake a remedial study skills course.

Students who expressed concerns relating to technical issues and poor recording quality felt that students and staff would benefit from explicit training in educational technology including general use and troubleshooting. Some suggested making lecture recordings in a studio, lecturer's office or other quiet space.

## **Reading selectively and strategically**

Students with dyslexia reported reading very selectively and strategically:

*“I only read when absolutely necessary. I would read the textbook, and try to just read the sections that were relevant to the particular homework task, and look for the information I need, and then just read the rest of the chapter if I couldn’t complete something.”* – Dyslexic student, age 27, deferred

*“I only read when I really have to, like when there’s an exam coming up, or an assignment. ... but I don’t read the whole articles.”* – Dyslexic student, age 18, 1st year

*“I don’t read any non-compulsory readings. I do read the printed course readers”* – Dyslexic student, age 37, 1st year

By contrast, students without dyslexia generally described reading extensively and without difficulty.

*“I do lots of reading. I read the set readings, prescribed texts, journal articles, and links online.”* – Non-dyslexic student, age 18, 1st year

*“[Reading is] just something I do. It’s all fine.”* – Non-dyslexic student, age 35, 1st year

Dyslexic students described difficulty reading journal articles and other prescribed readings that were long or complex. This seemed to particularly concern students if they felt the reading was only partially relevant to the topic. For example, students with dyslexia stated:

*“It’s unhelpful if there’s too much [to read] and there’s just one small point that we need to know from it.”* – Dyslexic student, age 41, 5th year part-time

*“Giving masses of reading is not helpful, especially when a lot of it is not relevant to the topic.”* – Dyslexic student, age 36, graduated

Similar sentiments were also expressed by a few non-dyslexic peers:

*“Poor choice of readings [can be unhelpful], when material is too complex, not at student level.”* – Non-dyslexic student, age 26, 1st year

Of course, reading journal articles is an important part of university education, and the key consideration for lecturers selecting appropriate course readings must be academic worth. However, readings were a key concern for students with dyslexia and may warrant consideration.

One student with dyslexia felt it would be helpful for the university to publish guidelines on the number of pages of reading expected in each subject, rather than just an overall indication of the expected time spent on study tasks.

Reading online also caused particular difficulty for many dyslexic and non-dyslexic students. Approximately half of all students (7 out of 13 dyslexic; 11 out of 20 non-dyslexic) stated a preference for reading printed copies rather than on-screen text. Key issues were glare and eye strain when reading online.

Those who printed the readings also expressed difficulty with the time and expense required.

*“Because everything’s online I have to spend a lot of time and money printing, because I don’t like reading long readings on the screen”* – Dyslexic student, age 18, 1st year

Approximately half of the dyslexic group (7 out of 13) also expressed a strong desire for print-on-demand course readers. Only a few non-dyslexic students expressed such an interest (2 out of 20).

*“I like printed readers because they don’t hurt my eyes and they’re organised into weeks so I know what I’ve got to read and when”* – Dyslexic student, age 19, 1st year

### **Finding additional videos online**

More than 35% of students with dyslexia (5 out of 13) stated that they found their own videos online to replace or supplement prescribed readings. They explained:

*“Mostly I just try to find something on the topic on YouTube. ... It makes more sense to me, hearing someone being interviewed, as opposed to reading about it.”* – Dyslexic student, age 29, 1st year

*“I YouTubed quite a few things from the lectures and textbook that I still didn’t understand, and I found videos that explained it with pictures, and it stuck in my mind a lot quicker.”* – Dyslexic student, age 36, graduated

Many non-dyslexic students also stated that they enjoyed videos and learned well from them. However, only one described searching for additional videos online.

Some students with dyslexia wanted videos to be included in official subject resource lists. One commented that this would enable students to feel confident that the videos they were watching were high quality and covered the course content.

### **Assessment challenges**

Almost all students, both dyslexic and non-dyslexic, indicated that they disliked high-stakes written examinations and felt that they were a poor method of assessing knowledge and skills. Many mentioned stress associated with written examinations, and some commented that this assessment method is rigid, artificial, stifles creativity and does not reflect real-life situations or abilities. Students with dyslexia also described particular difficulty in written examinations due to noise and other distractions such as shuffling papers, coughing, sneezing, and outside construction noises.

Despite these difficulties, fewer than 25% of students with dyslexia (3 out of 13) received adjustments to examination conditions, such as a smaller exam room, extra time and extra breaks. The students receiving these adjustments stated that they were of limited usefulness. For example, extra time was not much help for a student who fatigued easily, and a smaller room introduced new challenges for another student because it did not have a clock and the invigilator sat directly behind the student shuffling papers. One student with dyslexia had requested written examinations to be printed on a particular coloured paper and in a designated font, and stated that this was helpful.

Many students felt that assessments should be divided into more frequent, shorter, lower weighted tasks. Some also felt that a wider choice of assessment modalities should be offered, including individual conversations with a tutor, practical skills demonstrations and video assignments.

### **Limited uptake and suitability of disability support**

Only three of the thirteen dyslexic students reported receiving support from the disability service, which primarily took the form of examination adjustments. Only one received day-to-day learning support including note-taking, tutoring and assistive technology, and stated that these services were somewhat helpful but had been difficult and time-consuming to organise.

*“I requested a note-taker from the disability service in the beginning of the year and it took me till week 9 to get it.”* – Dyslexic student, age undisclosed, graduated

This student would manage these delays by planning far in advance:

*"I have to pre-plan everything ahead, I look at the subject outline, I look at how it's being delivered, some subjects I won't pick because I know it's just going to be a nightmare. I would often enrol in subjects that I knew I wouldn't be able to complete, so that I could see what the subject was like and get the books onto the daisy reader for the next semester." – Dyslexic student, age undisclosed, graduated*

Other students expressed various reasons for not accessing assistance from the disability service. These included lack of awareness of the services available, poor suitability of services, and deliberate choice.

*"A note taker? Oh my god, I didn't know that existed! That would be great ... but not if it's just linear notes, only if they use my special technique." – Dyslexic student, age 37, 1st year*

*"A note-taker? I wish! A little fairy to take notes for me? That would be amazing!" – Dyslexic student, age 27, deferred*

*"I tried a screen reader the other day but it wasn't helpful, because if you're reading anything with references or citations, it reads out all of that, so the normal flow is gone, and there's no intonation or stress, it's all robotic. It would be good if it could be more natural." – Dyslexic student, age 37, 1st year*

*"I don't like to have too much help because I feel that I should depend on myself. I take it in moderation." – Dyslexic student, age 20, 2nd year*

### **Difficulties resolving grievances**

Two students with dyslexia raised issues relating to adverse treatment by staff and subsequent difficulties with the complaint management process. It is impossible to determine the precise details of these situations and suggest appropriate strategies without further investigation of the issues involved. However, it was clear that these two students felt unsupported. A mentoring and coaching program recently implemented by the university's disability service may help such students to better negotiate these circumstances and feel more supported.

## **Discussion**

The following discussion highlights some key features and findings of this study and discusses them in the context of the scholarly literature.

### **Participants**

With regard to the study participants, it is noteworthy that the reading assessment only identified 6 of the 11 students who had self-identified as dyslexic. Possible reasons include previous misdiagnosis, incorrect self-report, effective remediation, effective use of adaptive strategies, or low sensitivity of the single-word reading test to difficulties reading connected text.

However, as outlined previously, there is poor consensus in the literature regarding dyslexia definitions and testing methods for adults. Therefore, these techniques were selected to reflect current best practice. The study findings also verified that the experiences of students who self-reported as dyslexic were similar to those classified dyslexic on the basis of reading test scores.

Furthermore, two participants who volunteered to be in the non-dyslexic peer comparison group were classified as dyslexic based on their reading test scores. These students also demonstrated similar patterns of findings to the students with a prior diagnosis of dyslexia. It was therefore deemed appropriate for them to be included in the

dyslexic group. This finding supports the body of literature that suggests some students arrive at university without diagnosis or support (Kirk et al., 2001; McLoughlin, 2001; Tanner, 2009). This pattern could have implications for student wellbeing, service provision and student retention.

It is also interesting to note the difference in gender ratio in this study, with females representing 85% of the non-dyslexic group, compared to 54% of the dyslexic group. The average age of dyslexic students was also slightly higher than the non-dyslexic group (26.3 years compared to 21.95 years). However, no clear patterns emerged regarding age or gender differences and learning strategies. Further investigation of these factors may be warranted in future studies.

### **Emergent themes**

A number of positive and negative themes emerged from the interview data. Positive themes included appreciation for engaging speaking style and flexible lecture formats, deep engagement with learning tasks and use of many self-directed learning strategies that could be viewed as strengths.

These findings are consistent with those of previous researchers (Kirby et al., 2008; Pino & Mortari, 2014; Olofsson, Taube, and Ahl, 2015), who found that students with dyslexia used deep learning strategies more often than their non-dyslexic peers and used more study aids and coping strategies. These types of characteristics and behaviours tend to be highly sought after in workplaces.

However, negative themes such as difficulties and frustration also emerged. Challenges became evident across most aspects of university learning experiences for students with dyslexia. The patterns reported by students with dyslexia in this study broadly confirm and support those reported in previous research (Pino & Mortari, 2014; Olofsson, Taube, and Ahl, 2015), including difficulties with note-taking, reading journal articles and course books, technology, accessibility and adjustments. Although some students will overcome these difficulties, the additional effort may lead to greater frustration and lower completion rates than might otherwise be expected.

An important finding from this study was that the dyslexic students reported spending a great deal of effort on learning tasks. Participants with dyslexia described engaging with learning tasks intensively and frequently, using multiple strategies.

Possible advantages of this effort could include deeper learning and development of creative problem-solving skills. Disadvantages may include insufficient time to research topics broadly, difficulty balancing paid work and other responsibilities, mental health risks of overwork, and less time to participate in social, sporting, artistic and other extra-curricular activities.

These findings add to moral and legal justifications for provision of accommodations for university students with dyslexia. Future research in this area should focus on gathering objective quantitative data regarding the number of hours per week students with dyslexia spend on learning tasks compared to other students.

Also noteworthy was the strong appreciation among students with dyslexia for face-to-face lectures and for recorded lectures that included a video of the lecturer's face. This is particularly important in light of recent trends in the higher education sector towards partially and wholly online courses. Such changes must be critically appraised to prevent compounding disadvantage to students with dyslexia. It may be important to continue offering some face-to-face lectures, and to ensure that recorded lectures include a video of the lecturer talking.

With regard to reading materials, an interesting finding was that approximately half of the students, both dyslexic (7 of 13) and non-dyslexic (11 of 20), in this predominantly young cohort (average age 23.7 years) expressed difficulty reading text online and using learning technologies.

This contradicts assertions from authors such as Prensky (2001) that the 'net generation' are all 'digital natives' and can be expected to use educational technology with ease and proficiency. Rather, the data from this study support the findings of Kennedy and colleagues (2006) and other researchers that students in the 'net generation' are not necessarily technology experts, and may require explicit technology training.

Another key finding was poor uptake of disability support services by students with dyslexia, which was consistent with patterns seen in the international data (Mortimore & Crozier, 2006; Olofsson et al., 2012). These findings supported and expanded on explanations cited in the international literature such as poor awareness of services, and poor suitability of services.

Most services described by students in this study seemed to be designed for people with low vision, illiteracy, general learning disabilities or physical disabilities, rather than students with dyslexia per se. New services may therefore need to be designed specifically for students with dyslexia or existing services tailored to this group. For example, students in this study suggested dyslexia-specific tutoring and tailored note-taking services.

The strategies used or suggested by students in this study were consistent with current best practice inclusive design and accessibility standards (Kerr & Baker, 2013). For example, findings of appreciation for videos, images, and face-to-face teaching support the efficacy of multi-modal or multi-sensory teaching for dyslexic learners.

This reflects current research and best practice that has shown that all learners generally benefit from having information presented in both auditory and visual modalities (Schnottz, 2002). It has also been shown that all students learn better from lectures presented in shorter segments of 5-20 minutes rather than longer durations of 60-120 minutes or more (Wankat, 2002). This is in keeping with recent educational trends toward the 'flipped classroom' model, in which lectures are broken into smaller chunks and interspersed with other activities (Milman, 2012).

The data from this study also indicated that the dyslexic students were mostly managing their own difficulties on an individual level with minimal access to or assistance from each other. Each student with dyslexia in this study reported developing a unique set of compensatory strategies in isolation from other students and without any method for sharing strategies or supporting each other. None reported any contact or support from any peer support group or dyslexia organisation.

In the context of the broader disability and social inclusion literature (Charlton, 2000; Nunan, George & McCausland, 2000), moving towards a more collectivist societal approach could be desirable. It seems logical that students with dyslexia may benefit from collaborating with each other and sharing their ideas, strategies, experiences and insights. A small group tutoring program for dyslexic students recently implemented at the study university may assist with this. Evaluation findings from this initiative were not yet available at the time of publication.

### **Validity and limitations**

The greatest threat to validity in qualitative interview-based studies is potential for researcher bias (Johnson & Christensen, 2012). In this study, the main risk of researcher bias was from the chief researcher who was also a post-graduate student with dyslexia.

This risk was primarily controlled by including two co-researchers from different backgrounds to provide investigator triangulation. The interviews were also conducted using a semi-structured interview schedule (see **Appendix 1**), which further minimises the risk of researcher bias by providing a standard script for all interviews.

Another threat to validity is participant bias. This was somewhat controlled by analysing patterns across multiple participants. Future research could further control for this by cross-referencing data from student interviews with similar data from lecturers and university administrators, or by collecting objective quantitative data.

The qualitative design and small sample size of this study also restrict the study's external validity or potential to generalise its findings to other populations (Johnson & Christensen, 2012). However, analysis of the demographic data indicates a diverse (though not necessarily representative) study sample. This enables us to create tentative theories, which may form the basis for further research across multiple universities.

Another limitation of this study is that it does not assess efficacy or cost of the strategies suggested by students. Therefore, practical application may be limited. Further research is needed to determine whether strategies are effective, affordable and practical to implement.

The qualitative evidence presented in this paper may not be sufficient to justify high-cost strategies. However, low-cost and cost-neutral measures may potentially be justified on the basis of these findings.

### **Future research directions**

A great deal of research is still needed in this area. The top priority should be longitudinal quantitative research with large sample sizes to fill gaps in the research literature. Determining participation rates and retention patterns of dyslexic students in higher education across the globe will be crucial, and should ideally be based on longitudinal data that includes objective testing. This would enable researchers to clearly define the emerging patterns and determine whether there are any statistically significant differences between dyslexic and non-dyslexic groups with regard to university representation, experiences and attainment.

Findings of the current study should also be further explored. Cross-analysis should be conducted comparing student perceptions with those of lecturers and university administrators, and with objective quantitative data regarding university provisions. Quantitative comparative analysis of the number of hours dyslexic and non-dyslexic students spend on study tasks could also be very informative.

Comparative quantitative studies of absolute and relative efficacy and costs associated with the various strategies will also be needed to guide implementation. Investigation of potential facilitators and barriers will also be important, as well as pilot implementation studies and their evaluation.

## **Conclusions**

This research paper contributes to the emerging literature regarding the day-to-day learning experiences of students with dyslexia at university. It reveals that university students with dyslexia face considerable learning and assessment challenges and also exhibit various strengths.

Strategies perceived as helpful are identified at both individual and institutional levels. They include individual study techniques, adjustments to course materials, offering a variety of teaching and assessment formats, and providing specific staff and student training.

Further research is needed to examine these issues using larger student samples across multiple institutions and to explore possible practical applications. However, the current findings offer some valuable insights into factors that may contribute to university success for students with dyslexia.

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## Appendix 1: Interview Schedule

Participant #: \_\_\_\_\_

Date: \_\_\_\_\_

The purpose of this research is to find out about your learning experiences at university. I've written some questions to guide our discussion, but I'm interested in hearing about whatever is important to you. So please feel free to talk about other topics too.

Key Question	Probe Questions
1. Let's start by talking about the kinds of things you do at university to learn your course material, and how you are assessed.	<p>a. What kinds of things do you do to learn your course material?</p> <p>b. Do you go to face-to-face lectures? Recorded lectures? Tutorials? E-learning? Individual reading? Videos? Audio podcasts? Peer discussions? Lab or fieldwork? Practical Placements?</p> <p>c. And what kinds of assessments do you do?</p> <p>d. Do you do exams? Assignments? Presentations?</p>
	<p>e. Please describe what happens in your <b>face-to-face lectures</b>?</p> <ul style="list-style-type: none"> <li>- What features are helpful or unhelpful?</li> <li>- What could make them better?</li> </ul>
	<p>f. Describe what happens with <b>recorded lectures</b>?</p> <ul style="list-style-type: none"> <li>- What features are helpful or unhelpful?</li> <li>- What could make them better?</li> </ul>
	<p>g. Describe what happens in your <b>tutorials</b>?</p> <ul style="list-style-type: none"> <li>- What features are helpful or unhelpful?</li> </ul>

	<ul style="list-style-type: none"> <li>- What could make them better?</li> </ul>
	<p>h. Describe what happens in your <b>e-learning</b>?</p> <ul style="list-style-type: none"> <li>- What features are helpful or unhelpful?</li> <li>- What could make them better?</li> </ul>
	<p>i. Describe what happens in your <b>individual reading</b>?</p> <ul style="list-style-type: none"> <li>- What features are helpful or unhelpful?</li> <li>- What could make them better?</li> </ul>
	<p>j. Describe the <b>videos</b> you watch and how you watch them?</p> <ul style="list-style-type: none"> <li>- What features are helpful or unhelpful?</li> <li>- What could make them better?</li> </ul>
	<p>k. Describe the <b>podcasts</b> you listen to and how you listen to them?</p> <ul style="list-style-type: none"> <li>- What features are helpful or unhelpful?</li> <li>- What could make them better</li> </ul>
	<p>l. Describe what happens in your <b>peer discussions</b>?</p> <ul style="list-style-type: none"> <li>- What features are helpful or unhelpful?</li> <li>- What could make them better?</li> </ul>
	<p>m. Describe what happens in your <b>lab or field work</b>?</p> <ul style="list-style-type: none"> <li>- What features are helpful or unhelpful?</li> <li>- What could make them better?</li> </ul>
	<p>n. Describe what happens in your <b>practical placements</b>?</p> <ul style="list-style-type: none"> <li>- What features are helpful or unhelpful?</li> <li>- What could make them better?</li> </ul>
Now moving on to your assessments...	<p>o. Describe what happens in your <b>exams</b>?</p> <ul style="list-style-type: none"> <li>- What features are helpful or unhelpful?</li> <li>- What could make them better?</li> </ul>
	<p>p. Describe your <b>assignments</b> and how you do them?</p> <ul style="list-style-type: none"> <li>- What features are helpful or unhelpful?</li> <li>- What could make them better?</li> </ul>
	<p>q. Describe your <b>class presentations</b>?</p> <ul style="list-style-type: none"> <li>- What features are helpful or unhelpful?</li> <li>- What could make them better?</li> </ul>
2. Now I'd like to know your opinions about the learning and assessment activities we've been discussing	<p>a. Do you particularly <b>like or dislike</b> any of the types of <b>learning activities</b> we've discussed?</p> <p>b. Please rate each of them on a scale of 1 to 5 where 1 means you really dislike it, 5 means you really like it.</p> <p>c. Do you particularly like or dislike any type of assessment?</p> <p>d. Please rate each of them on a scale of 1 to 5 where 1 means you really dislike it, 5 means you really like it.</p> <p>e. Do you think any of the types of <b>learning activities</b> helps you <b>learn</b> particularly well or particularly poorly?</p>

	<p>f. Please rate each of them on a scale of 1 to 5 where 1 means you learn particularly poorly with this learning activity and 5 means you learn particularly well with it.</p> <p>g. Do you think any of the assessment types is particularly helpful or unhelpful to your learning?</p> <p>h. Please rate each of them on a scale of 1 to 5 where 1 means it is particularly unhelpful to your learning and 5 means it is particularly helpful.</p>
3. Now I'd like to ask about things you do to manage your learning	<p>a. Do you use any <b>resources or support services</b> to help you with your learning?</p> <p>b. And with your assessments?</p>
	<p>c. Do you find any of these services or resources particularly helpful or unhelpful for your learning?</p> <p>d. Can you please rank them on a scale of 1 to 5 where 1 is very unhelpful and 5 is very helpful?</p> <p>e. Do you find any of them particularly helpful or unhelpful for your assessments?</p> <p>f. Can you please rank them on a scale of 1 to 5 where 1 is very unhelpful and 5 is very helpful?</p>
	<p>g. Do you use any <b>other strategies</b> to help you with your learning?</p>
	<p>h. Can you suggest anything else that could improve your learning experiences?</p>
4. Is there anything else you'd like to mention about your learning experiences at uni?	