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An exploratory study of students with dyslexia in a mixed online and on-campus environment at an Australian regional university

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ABSTRACT

Research suggests that tertiary students with dyslexia are less likely to achieve high or passing marks in their studies than students without dyslexia. The aim of this investigation was to discover the nature of barriers faced by students with dyslexia at an Australian regional university where two thirds of the overall population had a distance component to their study. First, a validated survey was used to recruit students for interview. Second, a varied sample of twelve students was selected for participation in hour-long semi-structured interviews. Themes that emerged from the data are related to time and effort, videos and lectures, skills and assessment and services and adjustments. Findings of the study underscore the need for educators to rethink the effectiveness of traditional models for supporting students with dyslexia. Implications toward more inclusive practice in the teaching of university students with dyslexia in a mixed online and on-campus environment are discussed.

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Introduction

The word *dyslexia* is derived from two word roots from Ancient Greek: *dus* meaning difficulty and *léxis* meaning word – difficulty with words. An important early characteristic of dyslexia is difficulty in breaking spoken words down into individual sounds, known as phonemes, and identifying correspondences of these sounds with their spellings (McCandliss & Noble, 2003; Pugh et al., 2000). It is caused by differences in the brain (American Psychiatric Association [APA], 2013; McCandliss & Noble, 2003; Pugh et al., 2000); therefore, although people with dyslexia often do learn how to read, they may experience difficulties into adulthood (APA, 2013; Hatcher, Snowling, & Griffiths, 2002; Mortimore & Crozier, 2006). It is estimated that around 5 to 15% of the population has dyslexia (Skues & Cunningham, 2001).

A number of studies suggest that the impact of dyslexia on a person's ability to succeed at university can be significant (Bergey, Deacon, & Parrila, 2017; Murray, Goldstein, Nourse, & Edgar, 2000; Richardson, 2015; Richardson & Wydell, 2003). In a study by Bergey et al. (2017), university students with a history of reading difficulties

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received lower grades than students without such difficulties and were more likely to fail or withdraw from units of study. The authors suggest that this could prolong students' studies and therefore the cost of their education; it could also increase the likelihood that they will not finish their degree (Bergey et al., 2017). This has the potential to create social inequity since higher education can lead to better employment opportunities, improved social mobility and greater participation in the society (Chesters, 2015; Coates & Edwards, 2009; Nunan, George, & McCausland, 2000).

People with disabilities are among six groups identified by the Australian Government's *Fair Chance for All* policy as being under-represented in tertiary education (Department of Employment, Education and Training [DEET], 1990). To achieve equity, the proportion of people with disabilities at university should be the same as the proportion in the general population (DEET, 1990). This is not yet the case, although the number of people with disabilities at university has more than doubled since the policy was first introduced (Ryan, 2011). Research suggests that the actual number of students with disabilities such as dyslexia may be even greater than what is officially known, due to issues related to awareness and disclosure (Bergey et al., 2017; Grimes, Southgate, Scevak, & Buchanan, 2019; Ryan, 2011). Universities have a legal and ethical responsibility to support and retain students including those with dyslexia (Disability Discrimination Act, 1992; Ryan, 2011). To do this, it is necessary to determine potential challenges faced by these students in order to identify means of support (e.g. Mortimore & Crozier, 2006).

Much of the research on dyslexia focuses on children (McLoughlin & Leather, 2013; Mortimore & Crozier, 2006; Tanner, 2009). Some research has also been conducted on the challenges experienced by adults with dyslexia (e.g. Denhart, 2008; Hanafin, Shevlin, Kenny, & Mc Neela, 2007; MacCullagh, Bosanquet, & Badcock, 2017; Mortimore & Crozier, 2006); however, most of this research has taken place in Europe and North America, especially regarding experiences of university students with dyslexia. Very little published research has explored the experiences of adults with dyslexia at Australian universities and more work in this area is needed (MacCullagh et al., 2017; Serry et al., 2018). The aim of this investigation was to identify barriers faced by students with characteristics of dyslexia both with and without an assessment for dyslexia at an Australian regional university where over two thirds of the student population had a distance component to their study.

Background

Difficulties and preferences of people with dyslexia

Several difficulties and preferences have been identified in the literature for university students with dyslexia. Adults with dyslexia have been found to perform lower than those without dyslexia on validated tests related to language processing such as spelling and non-word reading (Callens, Tops, & Brysbaert, 2012; Hatcher et al., 2002) and to take more time to perform tasks such as reading and writing than students without dyslexia (Hatcher et al., 2002; Hebert, Zhang, & Parrila, 2018). These differences can make university challenging for people with dyslexia in comparison with their peers; for example, in a survey of 136 university students in the United Kingdom, a significantly greater number of students with dyslexia reported having difficulty with skills such as reading and

organising essays than those without (Mortimore & Crozier, 2006). Challenges may also have an impact on students' preferences; for example, Waterfield and West (2006) asked university students with and without dyslexia to rank assessment types from a list of 47 possible choices. In this study, students with dyslexia were found to prefer oral projects over essays; the opposite was true for students without dyslexia.

Time and effort

Several studies of university students with dyslexia describe findings related to time and/or effort (Denhart, 2008; Fuller, Healey, Bradley, & Hall, 2004; O'Byrne, Jagoe, & Lawler, 2019; Serry et al., 2018). MacCullagh et al. (2017) interviewed 13 Australian university students with and 20 students without dyslexia and found time and effort to be an important overarching theme for those with dyslexia. For example, many students with dyslexia reported having difficulty with the complexity and amount of reading required for their courses. It was observed that they read 'very selectively and strategically' and disliked readings for which large amounts of effort resulted in only a small amount of usable information (p. 12). Eighty-four percent of the students with dyslexia in a study by Serry et al. (2018) reported that they 'had to put a lot more' or 'a bit more' effort into their study than other students (p. 11). In a study by Fuller et al. (2004), a 55-year-old student with dyslexia stated, 'Assignments take about 10 times longer than they should take me and I feel stupid asking for extensions' (p. 312).

Note-taking and lecture formats

One of the most commonly reported difficulties for students with dyslexia has been difficulty with note-taking during live lectures; students reported that lectures moved too quickly for them to take notes and they simply could not watch the lecturer or lecture materials and take notes at the same time (Fuller et al., 2004; MacCullagh et al., 2017; Mortimore & Crozier, 2006; Olofsson, Ahl, & Taube, 2012).

Distance education and growing use of technology may be expected to go some way towards reducing this challenge. Students can receive information from their lecturers in audio-visual form and they may watch the recordings as many times as they need to understand, note down and retain information (MacCullagh et al., 2017; Serry et al., 2018). MacCullagh et al. (2017) found that videos were also used by students with dyslexia to replace or supplement course readings: 35% of the interviewed students with dyslexia reported that they independently sought additional videos to help them understand course content (p. 13). Despite this, both Serry et al. (2018) and MacCullagh et al. (2017) found that many students preferred face-to-face lectures. Among the reasons cited for this were that students could interact with lecturers (Serry et al., 2018) and that they could 'access visual, auditory and non-verbal cues simultaneously' (MacCullagh et al., 2017, p. 8). To address the latter issue, MacCullagh et al. (2017) recommend that recorded presentations include a video of the lecturer.

Assessment

Assessment can be a significant source of difficulty and anxiety for students with dyslexia (Chanock, 2008; Fuller et al., 2004; Hanafin et al., 2007; MacCullagh et al., 2017; Pino & Mortari, 2014; Waterfield & West, 2006), so much so that some students with dyslexia choose their courses of study according to the types of assessment that are *not* used, such

as written assignments or timed examinations (Fuller et al., 2004; Waterfield & West, 2006). Most types of written assessment are challenging for students with dyslexia (Mortimore & Crozier, 2006); however, high stakes, written examinations, which require students to demonstrate their knowledge through writing in a limited amount of time, are especially challenging (Hanafin et al., 2007; MacCullagh et al., 2017; Pino & Mortari, 2014).

Over-reliance of many courses on certain types of assessment presents a number of ethical issues and is not always based on sound adult learning principles (andragogy) (Brown, 2004-2005–2005; Chanock, 2008; Hanafin et al., 2007; Waterfield & West, 2006). For the student with dyslexia, it also often necessitates the securing of adjustments such as extensions for written assignments or extra time on examinations. Problems with this system are described in greater detail in the next section.

Adjustments and support

In Australia, the Disability Discrimination Act (1992) requires that learning institutions provide equal access to enrolment and participation in a course of study for people with a disability. According to the Australian Disability Standards for Education (2005), institutions may fulfil this obligation by providing reasonable adjustments such as additional time for examinations or the use of assistive technology. Students wishing to access such adjustments must have an assessment from a medical practitioner for their disability. Reasonable adjustments are then negotiated on an individual basis depending on the inherent requirements of the student's chosen course of study and the nature of their disability as outlined in their assessment (Cumming, Dickson, & Webster, 2013).

There are several problems with this arrangement. First, many students do not realise that they have dyslexia before they get to university (Bergey et al., 2017; MacCullagh, 2014; Madriaga, 2007; Pino & Mortari, 2014); this may be especially true in Australia, where 'principals, classroom teachers, other professionals who work in schools (e.g. speech pathologists, psychologists), parents and students are often unaware of the phenomenon of LD [learning disabilities]' such as dyslexia (Skues & Cunningham, 2011, p. 159). Once a student becomes aware that they may have a learning difficulty, they have to go through the sometimes lengthy process of getting a medical assessment. In Australia, the cost of getting a formal assessment is also expensive (Grimes et al., 2019) and is not currently covered by the Government's medical care system (Serry et al., 2018; Skues & Cunningham, 2011; SPELD Queensland, 2021).

Second, even when students suspect that they have dyslexia and/or already have a formal assessment, they do not always disclose this to the university. Grimes et al. (2019) surveyed students at an Australian regional university and found that of 994 students who reported having assessments for difficulties that would impact learning, 633 of them – almost two thirds – had not disclosed their difficulties to the university. Important causes of non-disclosure are stigma and fear of discrimination and/or the belief that disclosure does not lead to useful support (Cameron & Billington, 2017; Grimes et al., 2019; Madriaga, 2007; Mortimore & Crozier, 2006; O'Byrne et al., 2019; Pino & Mortari, 2014; Serry et al., 2018).

Third, accessing adjustments can be problematic. Students are often unaware of the availability of disability support services or of certain adjustments or supports often available for people with dyslexia (Fuller et al., 2004; MacCullagh et al., 2017; Mortimore & Crozier, 2006;

Pino & Mortari, 2014; Serry et al., 2018) or are reluctant to use them (Cameron & Billington, 2017; Denhart, 2008; Grimes et al., 2019; Mortimore & Crozier, 2006; Pino & Mortari, 2014). Eligible students who are aware that adjustments are available and wish to access them also face a number of obstacles. These include long wait times to have an adjustment put in place (MacCullagh et al., 2017; Mortimore & Crozier, 2006; Pino & Mortari, 2014), the need for students to self-advocate in order to use adjustments (Fuller et al., 2004; Hanafin et al., 2007; Pino & Mortari, 2014) and in the case of assistive technology, inadequate training available to use adjustments effectively (Hanafin et al., 2007).

Finally, the kinds of adjustments available are not always sufficient. It has been well-established that students with dyslexia can have substantial difficulty with written assessment when compared to students without dyslexia (e.g. Mortimore & Crozier, 2006). Adjustments such as extra time on written exams and extensions on written assignments are helpful; however, frequent use of these types of assessments places students with dyslexia at a significant disadvantage (Chanock, 2008; Hanafin et al., 2007; Pino & Mortari, 2014). A possible solution to this problem is to provide alternative assessments for students with dyslexia (Herrington & Simpson, 2002), but this can be time-consuming and controversial (Lovett & Lewandowski, 2015; Sharp & Earle, 2000; Waterfield & West, 2010). Possibly for these reasons, alternative assessments for students with dyslexia are rarely reported in the literature.

In summary, despite legislation and measures put in place by most universities, it is likely that most students with dyslexia are not receiving adequate support.

Method

This research was granted ethics approval through the CQUniversity Human Research Ethics Committee (Application reference: RSH/4422). The study was conducted in two parts: through an online survey and through online and face-to-face interviews. Students were given the option of taking the survey with assistance or in paper-based form; however, no students chose to do this. All students took the online version of the survey, which began with a consent form. Students who did not grant consent were not able to proceed with the electronic form of survey. Students who agreed to participate in interviews were given a consent form, which was read and explained to them before signing. Students were informed of available support services and told that they could withdraw from the study at any time.

Survey

The survey was used to identify students with characteristics of dyslexia for recruitment to participate in the interview component of the study. It was called a 'Reading Difficulties Survey' and was advertised in several ways: it was made available through a small link at the bottom of a monthly newsletter emailed to all students, emailed directly to students registered with accessibility services at the university and emailed directly to all students enrolled in the university's enabling/bridging course. Academic learning advisers were also sent copies of the advertisement to distribute to students who might be interested. The greatest number of responses to the survey occurred after sending the direct emails to students registered with

Table 1. Critical items (Giménez et al., 2015).

How often do you . . . ? (scale of 0 to 4)
(1) mix up letters when reading
(2) mix up words when reading
(3) not understand what you have read
(4) have to read slowly in order to avoid confusion
(5) have to reread the text
(6) mix up letters when writing
(7) mix up words when writing
(8) make spelling mistakes
(9) mix up the order of numbers
(10) find it difficult to read aloud
(11) have trouble remembering what you have read
(12) find it difficult to express yourself by writing

accessibility services and to those enrolled in the enabling/bridging course. Undergraduate and post-graduate students and students from the enabling/bridging course were all eligible to participate in the survey.

The ATLAS survey, developed by Giménez, Luque, López-Zamora, and Fernández-Navas (2015), is a validated self-reporting questionnaire designed to identify university students with dyslexia. It was translated from Spanish in collaboration with one of the original authors of the survey. Several of the unscored items were also adapted to suit the context of this study: for example, the original survey asked if the participant was currently enrolled at university. Since our study was only advertised to enrolled students, that question was eliminated. The survey asks students to rate statements or choose from a limited range of answers to questions related to characteristics associated with dyslexia. In a study by Giménez et al. (2015), twelve items were found to be highly discriminating when attempting to identify individuals with dyslexia; for example, 38.4% of respondents with a diagnosis of dyslexia answered yes to the question 'Do you mix up letters when reading?' as opposed to only 3.1% of those with who had no previous diagnosis. Table 1 contains a list of the twelve critical items from the survey.

In the original study, the mean score for students with dyslexia on these twelve items was 25.3 (standard deviation: 6.36) and so Giménez et al. (2015) determined that a participant with a total score of 25 might have significant reading difficulties (A. Giménez, personal communication, 3 August 2017).

Twelve participants were to be selected for interview. The process of selection was as follows:

(1) Eliminate students who did not wish to be interviewed.
(2) Eliminate students who scored below 25 on the critical items.
(3) Eliminate students who answered *no* to the question, 'Do you consider yourself as having reading difficulties now?'
(4) Gather a sample that represented a variety of characteristics; consider especially whether or not the student has a formal assessment for a learning difficulty, their age, degree and course of study, mode of study and number of units completed.

As previously mentioned, a number of researchers suggest that there are students who reach university without knowing that they have dyslexia (Bergey et al., 2017; MacCullagh, 2014; Madriaga, 2007; Pino & Mortari, 2014). Because people with suspected dyslexia do not receive support in obtaining a formal assessment in Australia (Serry et al., 2018; SPELD Queensland, 2021), it was thought that there would be a number of students with dyslexia at our university who did not have an assessment. For this reason, it was desirable to recruit an equal number of students with and without a formal assessment for dyslexia for the interviews. When selecting from students without a formal assessment, we looked for other indicators that pointed to a learning difficulty. For example, dyslexia has been shown to be extremely heritable (American Psychiatric Association, 2013; Pennington & Lefly, 2001). Therefore, if a respondent had family members with a history of dyslexia and if they also had difficulty in learning to read at school, then that candidate was looked upon favourably for selection. Table 2 gives some details about the students selected for interview.

Interviews

Interviews of up to one hour were all conducted by the same researcher: three of these took place in person and nine were conducted via video conferencing software. Questions were loosely scripted (see Appendix). Inquiry was focused on several key areas including the following:

(1) the nature of each student's learning difficulties,
(2) the student's experiences at the university,
(3) strategies that the student uses to assist their learning or ability to complete assigned tasks,
(4) the student's awareness and use of services within the university.

Recordings of the interviews were transcribed and then systematically analysed by three investigators using qualitative content analysis (Schreier, 2014, p. 174): category names were generated in concept-driven and data-driven ways. That is, a coding frame was first developed at the 'structuring' phase, prior to the interviews. Next, during the 'generating phase,' researchers independently coded two of the transcribed interviews using NVivo software, generating additional subcategory names as necessary. The researchers then met to discuss and agree upon the coding frame. This process was repeated after coding two more interviews, at which time it was decided that saturation of category names had been reached.

Categories were topical: for the first area of investigation, *the nature of the students' learning difficulties*, we created a category for *skills*; there were 11 subcategory names under *skills* including *grammar, mathematics, note-taking* and *paraphrasing*. Parts of the following quotation were separately assigned to three different subcategories – *reading, memory* and *concentration* (all from the broader category *skills*):

> *I just struggle to read, struggle to concentrate. I can't memorise it, like that's just simple words, or simple things that I do every day that I just can't remember.*

Table 2. Characteristics of students selected for interview and their pseudonyms.

Pseudonym	Gender	Degree	Area of study	Time in degree	Number of subjects currently studying	Subjects completed	Mode of study	Age	Formal assessment of Dyslexia
Jacinta	F	Bachelor	Health	< 1 year	4	0	Mixed	< 25 years	No
Abigail	F	Enabling/ bridging	English, work or study preparation	< 1 year	1	0	Distance	26–35	Yes
Richard	M	Enabling/ bridging	English, work or study preparation	< 1 year	1	1–2	Mixed	26–35	No
Jennifer	F	PhD	Sociology	> 5 years	4	> 8	On campus	56–65	Yes
Taylor	F	Bachelor	Education or Humanities	> 5 years	2	> 8	Mixed	26–35	Yes
Thomas	M	Bachelor	Information Technology	3 years	1	> 8	Distance	36–45	No
Fiona	F	Bachelor	Health	1 year	4	5–6	Mixed	46–55	No
Melanie	F	Bachelor	Health	< 1 year	4	0	Mixed	< 25 years	Yes
David	M	Grad Dip	Science or Environment	2 years	2	3–4	Distance	56–65	Yes
Deborah	F	Enabling/ bridging	English, work or study preparation	1 year	1	3–4	Mixed	> 66	No
Kylie	F	Enabling/ bridging	English, work or study preparation	< 1 year	1	3–4	On campus	26–35	No
Faith	F	Bachelor	Health	< 1 year	3	0	Distance	26–35	No

Note that, while the student seemed to be frustrated about her difficulties with reading, no attempt was made to label her feelings. Feelings were only coded when interviewees made explicit reference to their feelings as in the following example, which was assigned to two subcategories, *stress and anxiety* and *exams*:

> *I get anxiety when it comes to exams and everything goes blank out of my head and I just guess*.

Following the coding process, the researchers independently analysed the data to determine major themes in relation to the original areas of investigation. The results were compared and discussed. Data for important individual categories were also independently summarised and compared for reliability.

Findings

Survey

Of 136 students who took the survey, 67 students scored above the threshold on critical items that are found to be associated with dyslexia. Fifty-two of these 67 students had some distance component to their study. Thirty-six were studying completely by distance.

Interviews

From the 67 students who scored above the threshold for critical items associated with dyslexia, 12 were selected for interview. Important themes that emerged from the data are grouped into the following headings: *time and effort, videos and lectures, skills and assessment* and *services and adjustments*. In the following analysis, all student names are replaced with pseudonyms for anonymity.

Time and effort

Nine of the twelve students interviewed spoke of the relatively large amount of time and effort that they felt it took for them to complete their studies compared to other students. Fiona, a full-time nursing student, reported that she studied 70 hours per week. David studied 10 or more hours a day in order to complete two graduate subjects.

> *. . . I'm such a slow reader and such a slow writer, I try to work three times as hard as everybody else and I don't sleep. So, I sort of get through it like that* (David).

For several students, the problem of keeping up with such a heavy workload was compounded by other responsibilities such as caring for family. When asked to elaborate on difficulties he had with writing in one of his units, Richard responded:

> *Time. Time was definitely a big factor. But then, I'm an adult student, and I have a family, and I work full time and so time's definitely a thing*.

In some cases, the workload was perceived to be unreasonable:

> *I'm so overwhelmed as well by maybe one subject having so much to read, so much information that they want us to go through, so many videos to watch that are an hour long. [. . .] I feel like there's so much to read, so much to do, and I don't think there should be that much* (Jacinta).

In just one week I had eight readings. And I'm like, this is a second-year subject, why would you have eight readings for a second-year subject when you've got to hand in an assignment in week six? (Taylor)

I've managed to not read all articles that they've asked us to read, because I just can't fit that in in four units of . . . it's just not physically possible (Fiona).

Several students felt that time was needlessly wasted by a lack of consistency in organisation and/or requirements between units of the same course:

I wish that they had, like, something that was official, like the marking rubric, that you open it up, it's the same document. It says 'font', then it's got the answer of how they want you to do it, because sometimes, like, I have to chase up two or three or four different assignment documents, that are telling us how to do it (Faith).

. . . I don't want to dumb down university just because someone has a learning difficulty and so on. [. . .] Just do like [online learning platform] pages, setting them up similarly, ... Just simple things like that (Thomas).

Seven of the students expressed having difficulty in navigating or reading the university's online systems:

. . . I click on some things and it doesn't work. So then I kind of got to go way back . . . I can't get to my email without having to go back to the [university's] main webpage and then log in again. I don't know how to get from the [online learning platform] back to go look at my email from there (Abigail).

Jacinta identified this issue as a significant obstacle in her first year:

At the start, I was pretty stressed, and a bit overwhelmed with the website. [. . .] I felt like I couldn't learn. I couldn't take in as much, because I was too busy worrying about how to use the website or how to write again and how to read again.

Strategies used to manage time included beginning work before the term started and taking a lighter course load:

I run from the start . . . I know how to plan and before the term even starts, I'm already writing up a monthly/weekly calendar of targets that I know that I need to hit in order to keep going and if I didn't do that from get-go, like start running from the get-go, I definitely would not be able to keep up (Melanie).

I've only knocked it back to one [unit] per [term] and doing three [terms] a year where I can, because I just can't handle the work life balance and stuff. I actually want to learn something, I just don't want to go through, get passes, and done (Thomas).

The university where this study took place has an internal assignment-checking service where undergraduate students can get feedback on organisation, grammar and referencing in their assignments. Not all of the students were eligible for this service because they were in the enabling/bridging course, were in a research degree or already had a referral to the university's academic support services. However, three students said that they were never able to take advantage of the assignment submission service because they were not able to complete their assignments far enough ahead of the due date.

Videos and lectures

Seven of the students indicated an appreciation for videos.

> *[One class used] a lot of videos, which is really good for me. [. . .] When they say it in so many words . . . When they say it in so many words, I find that jargon . . . I'd have to read that probably 20 times before it will get in anywhere* (Fiona).

> *I mean, [with] a video you can - when you get to an interesting piece you can stop and write down what the person is saying, so you can take notes easily with video than a live presentation. [. . .] I can go through - look at it a number of times* (David).

Four students reported that they occasionally sought additional videos on the internet for helping them understand their coursework; However, Thomas tried not to rely on these:

> *I'm trying to get into . . . reading more rather than taking the easy way out . . . So, it definitely helps just getting an explanation in a basic way from You Tube or something like that . . . but I try to avoid it.*

Students also valued live interaction with lecturers. Jacinta elaborated:

> *[Video conferencing lectures] have been pretty good, pretty helpful, because a lot of the students as well, they ask the exact same question that I'm thinking, so it makes me feel a lot better that there's all these other students that are going through the same thing that don't understand it as well.*

Two students talked about problems with videos and live lectures:

When asked if she found videos useful, Kylie responded 'no' because they were 'boring'. When asked to elaborate, her main reason was the inability to ask questions; however, she did like video conference sessions (Zoom) which she found to be more interactive.

Of recorded lectures, Thomas said:

> I've done units where the videos have been last semester's videos or something like that, and they put them in there and it's made it hard to interact or get involved in the course . . .

> And:

> *I've had some people . . . that just have been bland . . . they were just reading the PowerPoint and they weren't adding anything to the PowerPoint text, so I was literally falling asleep watching the lectures . . .* (Thomas).

Thomas had also dropped a unit because it did not contain any lectures at all and spoke at length about the importance of training new lecturers to speak in an effective and engaging manner.

Skills and assessment

All of the students in this study expressed that they had difficulty with reading:

> *I haven't sort of had the confidence I guess sometimes, to get words and so forth, like you know, and probably it stopped me from maybe attempting a university at a younger age [. . .]. It's just, you know I misread words or it'll take me a lot longer to read something [than] colleagues or friends, and it might not just be reading it - it might just be ingesting it sort of after I've read it, as well* (Thomas).

Most students reported that problems with reading had an impact on their ability to study:

> *. . . there might have been a lot of articles I could have used, but I did not understand the way it was written. And I just didn't know how to process it to understand it* (Jacinta).

> *During [an essay writing unit in an enabling course], I sort of realised that . . . reading the essay questions [. . .] just sort of working out what I had to do was a long process. So, it's not like I can just read it and then it's instantly sort of stuck. It doesn't work like that* (Richard).

Deborah stated:

> *I don't know, but with essay questions – sometimes, I have to read it a bit, and that's why I think I'm struggling this time, because I'm doing it distance, and I think I need to have a conversation with a group.*

Interaction with lecturers was also important 'for students. However, written, online interaction through forums was not an option for Melanie:

> *. . . I find the forums extremely confusing because you will have students post the same thing twice and you'll have answers scattered everywhere. Then the students will put in their own opinion on a question that was asked by another student and their opinion might be wrong and then you read all these opinions that could be wrong and then the lecturer will say what it really is and then it just gets all very tangled and everywhere.*

Jacinta spoke of the frustration of trying to find out what lecturers were looking for in writing tasks.

> *. . . they say it's not a trick question, but I feel like it is.*

She said that she found templates and interactive online lectures very helpful in clarifying expectations; however, she felt that she needed these to be provided much sooner in the term than they ordinarily were.

Two students expressed frustration with feedback on their writing. Abigail stated:

> *But then when I get the reviews back from my teachers, it's always that I need to work on my English and my grammar and I need to sound more smarter. I'm like, 'I understand you keep saying this but I'm trying. I don't know how to do smarter for you.'*

Ten of the students described difficulties with writing. The possibility of having to sit a handwritten exam at university nearly gave Jennifer cause to change her course of study:

> *Another thing I've always avoided, was written exams. Handwritten exam, exams . . . I wasn't going to do the honours. Then, luckily the year that I was actually going to go and do it, they changed it to assessment. I was quite lucky, because there was no way I was going to be able to sit down and do a three-hour exam, and handwritten.*

Writing requirements appeared to dominate some students' engagement with their units:

> *So, this term I had one, two, three, four – I think I had about five [essays] . . . That's definitely not without a huge struggle and a hundred different drafts* (Melanie).

> *Apart from the lectures that I try and see every week, all the material that they want us to read, I'm not even touching the edges, because I'm trying to focus on doing these assessments. And if I could sit back and read all those articles, I think I'd have the answers for these assessments* (Fiona).

When asked if he thought that all assessment pieces should be written, David said he believed that writing was important; students should be able to write. However, speaking of oral presentations he said this:

> *That's where I got my really high marks, 100 per cent in one case, it was absolutely unbelievable at university getting a high mark like that.*

Accessing and utilising supports

Of the twelve students interviewed, five had a formal assessment for dyslexia. Only four of these stated that they had registered for accessibility services at the university. This was despite all twelve students reporting difficulties in their studies. Two of the unregistered students stated that they did not know about the accessibility services at the university.

David reported that the process of discovering what support was available and what adjustments would work for him was a long one. When asked if he found the accessibility services to be useful, he said no, stating that his plan only allowed him extra time on exams and that it was not useful to him because most of his assessments were written. He felt that his needs were not understood:

> *Well, we should've gone to counselling much earlier, we should've gone to [academic support centre] much earlier, should've been them and the case officer that was managing me, that put me onto that but I stumbled my way through that. Maybe being able - for them to be able to work with my lecturers and making them understand what the issue was* (David).

Two students indicated that having a diagnosis and, therefore, access to adjustments was helpful. Kylie stated:

> *It's helped me by being able to talk to the university; I've been able to get a . . . I can't remember what they're called, but I'm able to get some extra time if I need it in exams, or on assessments that I don't particularly understand.*

David had been given voice recognition software, for which he was grateful, but he was never able to use it. When asked if he would have liked training in the software, he said:

> *Yeah, I would. I would've found that useful. Sorry, I needed to get in there the semester before, so I mean if you imagine if I was starting the first week and maybe getting [the software] week two, it was just all over for taking up something like [that]. It was just too late.*

Melanie was allowed a 'reader-writer' for exams. Her understanding was that she would not have to spell the words to the reader-writer. However, days before one of her exams, she was told by her lecturer that she would have to be able to spell the words. Her accessibility adviser told her that, if the lecturer required her to spell, she would have to spell. It was not until Melanie took action herself by contacting the course coordinator that the matter was resolved in her favour. However, this incident caused Melanie a considerable amount of stress both at the time and in the future:

> *So, I won't apply for [an extension] unless I really, really have to, even if it stresses me out so much because I don't want my accessibility plan to be rejected. I've got that concern that my accessibility plan isn't really that powerful.*

Fiona, who at the time of the interview did not have an accessibility plan, felt a lack of entitlement in asking for extensions:

. . . I did ask for an extension, but I felt so bad about it, because other people need it for a better reason, I think. You know?

Discussion

This investigation did not include a control group, so the extent to which students without dyslexia would report the same difficulties is unknown. However, it is felt that the following discussion is useful to inform policies and approaches that will be helpful to students with dyslexia at university and, potentially, all students.

Time and effort

The students with dyslexia in this study reported having considerable difficulty keeping up with the quantity of material required in their units. This finding was consistent with similar findings from other published research in this area (Denhart, 2008; Fuller et al., 2004; O'Byrne et al., 2019; Serry et al., 2018).

Barre (2016, July 11), who does not speak of students with dyslexia in particular, suggests that many lecturers may be unaware of the amount of time it takes for students to complete readings assigned to them. Lecturers may also underestimate the amount of time it takes for students to complete different types of assessment. At one Australian university, it was found that lecturers and students differed in their time estimations by up to 400% (Gill, 2013). These disparities are likely to be more pronounced for students with dyslexia than for those without (Hatcher et al., 2002; Hebert, Zhang, & Parrila, 2018).

Another issue identified in the present study was the amount of time and effort wasted by students in trying to find and navigate through course materials and requirements. Different units within the same course did not have consistent requirements in, for example, the formatting of assignments. These requirements were difficult to locate because there was no consistency in organisation between different units. It was also found that the relationship between different essential systems at the university was poorly understood by some students and confusing to navigate. These findings echo a similar pattern from the study by MacCullagh et al. (2017) who reported that students had difficulty in finding their online lecture recordings and readings.

Thoughtful consideration must be given as to how to make university study more manageable for students, especially those with dyslexia. The amount of reading given in a unit should be carefully evaluated. Lecturers who would like to recommend a wide range of readings could label them as either 'essential' or 'useful.' This would help students who need more time than others to prioritise readings and would encourage deeper engagement with those that are critical to understanding key concepts in the unit. Also, units within the same course should be consistent in their requirements and formatting. For example, units in a course should use the same referencing and document formatting styles (Gill, 2013). Furthermore, it is essential that universities consult available accessibility guidelines when selecting and developing online learning platforms such as the *Web Content Accessibility Guidelines* (WCAG) (WC3, 2008, as cited in Habib et al., 2012). Within these platforms, information should be laid out consistently across all units in the

same course (Habib et al., 2012). Regular support should also be provided for using such systems throughout the term – not just at orientations where students are often overwhelmed by large quantities of new information.

Other recommendations will be proposed in the following sections that may also help to reduce the burden on students' time and effort, although this may not be their primary purpose.

Videos, lectures and interaction

Unfortunately, some of the students interviewed were disappointed by the quality of recorded lectures; this is similar to findings from a study by MacCullagh et al. (2017). While this may not be unique to students with dyslexia, it was of special importance to Thomas, for example, who went so far as to drop a unit he was enrolled in because it did not contain any lectures.

Videos and live interactions may be especially important to people with dyslexia for several reasons. First, there is convincing evidence to support the idea that adult students with dyslexia experience challenges with reading (e.g. Hatcher et al., 2002; McCandliss & Noble, 2003; Mortimore & Crozier, 2006) and that they value videos and live lectures (MacCullagh et al., 2017; Serry et al., 2018). As mentioned previously, difficulties with note-taking during live lectures have also been frequently reported in the literature (Fuller et al., 2004; MacCullagh et al., 2017; Mortimore & Crozier, 2006; Olofsson et al., 2012). For these reasons, it is important that best practice is observed in the delivery of live and recorded lectures.

The data from this study suggest that some of the videos provided to students online were recorded versions of classroom lectures. This does not meet best practice guidelines for online video design, which indicates that videos for online use should be specifically designed for that purpose; recorded versions of classroom lectures are often of poor technical quality and are not engaging to the online viewer (Stone, 2019). Brame (2016) makes valuable recommendations for producing online videos that engage students and promote learning. These include breaking videos into shorter sections and speaking briskly and with enthusiasm.

Additionally, the following recommendations for videos, lectures and other forms of interaction apply specifically to students with dyslexia. Too much text is unhelpful for students with dyslexia and may hinder their ability to process information (MacCullagh et al., 2017; Shaul, 2014). When developing slides, lecturers should try to limit text and provide only key words and, whenever possible, concepts should be presented with accompanying pictures, diagrams, concept maps or flow charts (McLoughlin & Leather, 2013; Pino & Mortari, 2014). Additionally, recorded slide presentations should include a video of the presenter since this provides visual cues that may be helpful to students with dyslexia (MacCullagh et al., 2017) and is potentially more engaging for all students (Guo, Kim, & Rubin, 2014).

The students in this study placed high value on interaction with lecturers for clarification of information about important concepts and assessment. It is recommended that lecturers allow time to respond to students' verbal questions during live lectures and video conferencing sessions. However, lecturers are cautioned against relying on text-based chatting features for real-time interaction because of its potential to 'marginalis[e]' students with dyslexia (Woodfine, Baptista Nunes, & Wright, 2006, p. 705). Similarly, one

student in this study reported that she found online discussion forums confusing. A possible solution to this could be for lecturers to respond to forum posts in short weekly videos to students.

Skills and assessment

Accessing and utilising supports

The findings of this study suggested a need for information about accessibility and other services to be provided to students sooner and for greater advocacy by accessibility advisers. Providing such support can be complicated by issues with identification, stigma, fear of discrimination and disclosure (Grimes et al., 2019; Mortimore & Crozier, 2006). In addition to the wide and continuous promotion of academic services for all students, university staff should be made aware of the issues surrounding dyslexia and other hidden disabilities and encouraged to refer students for support as soon as a potential need is recognised. Support should be focused on students' individual needs and strengths; it should work toward helping students understand their challenges and develop helpful strategies and skills (McLoughlin & Leather, 2013).

Assistive technologies

Previous research has demonstrated that assistive technologies such as reading and voice recognition software can increase student autonomy and confidence (Pino & Mortari, 2014). However, of the students interviewed in the current study, four had access to such software, but only one student made regular use of it. Reasons for non-uptake were non-eligibility due to lack of a medical assessment for dyslexia, lack of knowledge that such software existed and lack of training. These reasons are consistent with those reported by MacCullagh et al. (2017).

It is recommended that universities provide technologies and training in how to make them universally accessible. This would help to avoid obstacles and inequities created in the lengthy process of trying to secure access; it may also allow students to learn how to use the software when time permits, such as before the beginning of the term.

Variety and choice in assessment

While assessment is just one part of the learning and teaching process, it has, arguably, the greatest impact on learning (Gibbs & Simpson, 2005; Hanafin et al., 2007; Waterfield & West, 2010). The students in this study expressed major concerns with assessment, especially essays. Over-reliance on traditionally favoured forms of assessment such as essays and timed, written examinations clearly disadvantages some students.

Waterfield and West (2010) propose that flexibility in assessment is beneficial for student success and can be approached in two ways: *reactively* or *proactively*. A reactive approach is the one where assessment practices remain as they are and students with a disability are granted special provisions to help them succeed; a proactive approach is the one where the assessment practices themselves are changed (Waterfield & West, 2010). For example, oral or video assessments may be offered as options for all students, including those with dyslexia.

There are many issues with the current, largely reactive approach to assessment flexibility adopted by most universities. The first is that it perpetuates a medical model of disability where anyone who is not a part of the mainstream is treated as outside of the norm; a truly inclusive model views *diversity* as the norm (Chanock, 2008; Grimes et al., 2019; Hanafin et al., 2007; MacCullagh, 2014; Madriaga, 2007; O'Byrne et al., 2019). In the current study, 45 of 67 students who scored above the threshold on the survey did not have a formal assessment for dyslexia or a related learning difficulty (e.g. ADHD or dyscalculia). Two of the students interviewed were unaware of the support that was available to students with dyslexia at the university. In addition, some students who did have access to adjustments did not find them helpful and in one case, a student had to fend for herself against a lecturer who did not understand her situation. These experiences strongly suggest that the current system of assessment adjustments is not meeting the needs of this student group.

A proactive approach requires regular evaluation of assessment practices to determine the extent to which they are effective and/or discriminatory. Students could be provided with a variety of assessment options and allowed to choose the option that best suits their strengths. This would allow all students the opportunity to demonstrate their learning and would benefit students with dyslexia and other differences (Fuller et al., 2004; Hanafin et al., 2007; Waterfield & West, 2010). It might also improve the quality of learning as students would be able to spend more time engaging with course content and less time on an assessment type that they very much struggle to do and may never encounter in their target profession (Chanock, 2007).

Limitations

Several limitations with this study must be acknowledged. First, since recruitment of participants with and without a formal diagnosis for dyslexia was desired, a self-report survey was used. No additional tests were given in order to ensure that the students in the study did, in fact, have dyslexia. However, studies have shown that self-report surveys can be an effective tool for identifying students with dyslexia (Giménez et al., 2015; Lefly & Pennington, 2000; Snowling, Dawes, Nash, & Hulme, 2012). Furthermore, it was demonstrated that the survey used in this study was reliable for our purposes since, in the study by Giménez et al. (2015), information about difficulties reported by participants correlated with their performance on psychometric tests; at a minimum, students in this study who scored above the threshold all reported significant difficulties in essential learning skills.

Another limitation was in relation to recruitment. Because of university policies about communicating information to students, we were unable to advertise widely across the university (for example, by direct email) and so our sample may not be representative. The number of survey participants peaked twice: once after a direct email to students registered with the university's accessibility service and again after a direct email to students enrolled in the university's enabling/bridging program. Advisers from academic support services were also asked to advertise the study to their students.

Third, this study did not include a comparison group; no students without characteristics of dyslexia were interviewed and so it is difficult to say whether the findings expressed here apply specifically to people with dyslexia or more broadly to a wider population. In either case, the findings should be worthy of consideration by university educators.

Finally, there was potential bias on the part of the researchers, who may be disproportionally familiar with and sympathetic to the issues under investigation. However, data were independently coded and analysed by three researchers and then compared to ensure reliability of findings.

Conclusion

The aim of this study was to identify barriers faced by students with characteristics of dyslexia at an Australian regional university. Of the twelve students interviewed, six were studying both on campus and online and four were studying completely by distance.

The students in this investigation reported significant difficulties with their studies, especially in relation to reading and writing. Just over two thirds of the students who tested above the threshold for having characteristics of dyslexia on a validated self-report survey did not have an assessment for a learning difficulty and so were not likely registered with accessibility services at the university. Furthermore, of the four interviewed students who were registered with accessibility services at the university, two reported that they had difficulties in accessing technologies and adjustments or that the adjustments offered were not helpful.

Therefore, the results of this study strongly suggest that traditional means of support for students with dyslexia through the provision of reasonable adjustments is not sufficient. Best practice in the design of online methods of teaching should be observed. For example, materials such as online learning platforms and videos should be carefully and consistently planned within a course according to available guidelines, and opportunities for dyslexia-friendly interaction should be provided. Thoughtful attention must be given to the amount of reading and other tasks assigned to students to ensure that demands on time are not unreasonable. Helpful resources such as assistive technologies should be made universally available, as well as training in how to use them. Most importantly, assessment practices should be carefully evaluated to ensure that they are equitable and allow all students the ability to demonstrate their learning. Such an approach would not only help to support students with dyslexia but would also likely benefit all students, including those from other at-risk groups.

According to Nunan et al. (2000), an inclusive society seeks to break the cycle of disadvantage by promoting equal opportunity for the 'participation and success' of all of its members (p. 63). The time to unpack old assumptions about what it means to study at university is long overdue. More research is needed to find out how to improve the content and delivery of university courses so that they optimise learning for all students. The greatest challenge lies in finding ways to bring real change in the culture of our institutions; it is toward this end, we propose, that future research is urgently needed.

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Appendix – Student interview questions

Introduction

Introduce self. Remind the participant of the following:

- The interview will be recorded for transcription. The recording or anything that can be used to determine your identity will not be used in the reporting of findings.
- You may stop the interview at any time and do not have to give a reason.
- Findings from the study will be available at the link in the info sheet or can be mailed/emailed to you by request.
- There are several student services available for support; however, I will not make any referrals without your consent. Available services are as follows:

Academic Learning Centre

Because you have difficulties with reading and/or writing, it is recommended that you request a referral for support in these areas.

Inclusion and Accessibility

An adviser from this department can help you find out where to get an assessment for difficulties if you do not already have one. An adviser can provide you with assistive technology such as, for example, text to speech software. They may also be able to arrange accommodations on your behalf – for example, for extra time on exams.

Student Life and Well-Being

There are counsellors at [our university] who can help with any issues that may affect your studies. They can also offer counselling if you are feeling frustrated, overwhelmed, confused or depressed.

Indigenous Student Support (Indigenous students only)

You are eligible for additional support in your subject area.

About the interview

The purpose of this study is to find out how the university can help people who have greater than usual difficulty with reading, writing and/or studying, which are all characteristics of dyslexia.

You have been chosen to participate in this study because of your answers in the *Self-Report of Reading Difficulties for Adults (ATLAS)* online survey. Your answers show that you may have greater than usual difficulty with reading and writing tasks. You also indicated in the survey that you were happy for us to contact you about further research.

About the participant

What is your major area of study?

How long have you been studying at [this university]?

Why are you studying at [this university]?

Dyslexia can be described as having difficulty with reading and/or writing, and with other things such as memorisation and organisation.

Do you think you might have dyslexia?

If so, when did you first begin to think you might have dyslexia?

Questions about the nature of the participant's learning difficulties and educational challenges.

Did your difficulties with learning affect your decision to put off study at any point?

Did your difficulties with learning affect your choice of subject area?

How did you feel when you first started at [this university]?

Did you attend any of the following?

- Orientation
- Get it together
- Academic Learning Centre workshops
- Other

Did you find these helpful? Why or why not?

Has your study at [this university] been a positive experience?

Do you feel that university is preparing you for your present or future job?
What things have you found to be especially difficult or frustrating?
Which of the following do you consider to be difficult?

- Reading course materials
- Doing research
- Managing your time
- Handwriting
- Spelling
- Grammar
- Concentration
- Memorising facts or information
- Taking notes

Writing essays, reports, etc.

- Referencing
- Understanding questions on exams
- Finishing exams on time
- Using the [university] website
- Using Moodle [an online learning platform]
- Using the [university] library
- Enrolling in courses
- Getting help
- Using email

Which of the following do you use? Why or why not?

- [Our university's] Facebook page
- UCROO [a social media site, like Facebook, for university]
- Zoom [video conferencing software]
- Forums
- Studiosity (YourTutor) [an external academic support service for students]
- Academic Learning Centre assignment submission or quick query

Do you have additional comments about any of the following?

- Moodle [an online learning platform]
- [university] Library
- study materials
- lectures
- textbooks
- course requirements
- assessment tasks

What strategies and services the student has used to address these issues.
Have you ever tried to get help in any of your subjects?
What kind of help have you sought?
Did you know about the following services (before today)?

- Academic Learning Centre
- Inclusion and Accessibility
- Student Life and Well Being
- Indigenous Student Support (Indigenous students only)

- Student Mentor
- TASAC

How did you know about them?
Have you accessed any of them?
Have you found any of them helpful? Why or why not?
Are there any you didn't know about that you think you might now use?
What strategies do you use to help with [difficulties mentioned earlier], for example, any of the following:

- Reading course materials
- Doing research
- Managing your time
- Handwriting
- Spelling
- Grammar
- Concentration
- Memorising facts or information
- Taking notes

Writing essays, reports, etc.

- Referencing
- Understanding questions on exams
- Finishing exams on time
- Using the [university] website
- Using Moodle [an online learning platform]
- Using the [university] library
- Enrolling in courses
- Using email

Do you use any of the following strategies?

- Create mind maps and other visual means of taking notes
- Skim before reading
- Use highlighters or coloured pens for taking notes or marking text
- Break down tasks into steps
- Use a timetable or diary
- Look for videos about the subjects you are studying
- Determine how much time to take on each question at the beginning of an exam
- Search for keywords in a question
- Plan your writing
- Seek out study groups

Students who have been assessed as having a learning difficulty and have been referred to Inclusion and Accessibility:

How did you come to be referred to Inclusion and Accessibility?
How has Inclusion and Accessibility helped you?
What assistive technologies have you been introduced to?
Have you found these helpful?
Have you ever been allowed extra time on exams or something similar?
Was it helpful? Why or why not?
Have you ever used or heard of any of the following?

- spellcheck
- Grammarly
- text to speech software
- speech to text software
- One Note
- notetaking software
- dyslexia-friendly fonts, coloured paper and/or overlays
- tinted glasses

Students who have not been referred to Inclusion and Accessibility:
Have you ever used or heard of any of the following?

- spellcheck
- Grammarly
- text to speech software
- speech to text software
- One Note
- notetaking software
- dyslexia-friendly fonts, coloured paper and/or overlays
- tinted glasses

Would you like to have access or be shown any of these?
To what extent these strategies and services have helped the student in his/her education.
Do you usually feel that you are on top of your studies? Why or why not?
Do you feel that you will be able to accomplish your goals at university?
What are your strengths? Do you feel you are able to demonstrate these in your studies at university? Do you think you will be able to in your present and/or future occupation?
Have you ever thought of dropping out of university?
Do you want to learn more about how to cope with your learning difficulties?
What strategies or services, if any, the student would like to see implemented.
Do you feel that [our university] cares about your success at university? Why or why not?
How do you think [the university] could better help you?
If you could design an ideal course, what would you do similarly or differently to how things are currently done in your courses?
How would you improve the following?

- Course materials
- Lectures
- Assessment tasks
- Support services
- the Library
- Moodle [an online learning platform] pages