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**Do digital devices enhance teenagers' recreational reading engagement?
Issues for library policy from a recent study in two Australian states**

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Running Head: Digital devices and teenagers' reading engagement

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Abstract

Digital platforms have become central to twenty-first century education, culture, and government, and libraries devote an increasing proportion of budgets to acquisitions of e-resources. This research reports on a recent project which investigated Australian teenagers' use of traditional print and digital platforms for long-form recreational reading. Specifically, it investigates whether digital devices are a preferred modality for Australian adolescents' recreational reading and if access to digital devices with e-reading capabilities, such as tablets, smartphones, e-readers, and laptop or desktop computers, is associated with more reading engagement by avid and reluctant readers. The research, based on a diverse sample of urban and regional participants from two states, suggests that Australian adolescents' preferences for e-books have been largely overestimated. Issues of relevance to public libraries are discussed.

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Introduction

Contemporary adolescents are often characterized as digital natives (Bennett, Maton, & Kervin 2008; Prensky 2001). However, recent research suggests that conceptualizing teens as a homogenous generational cohort pays insufficient attention to the way in which contextual factors such as socioeconomic position, gender, cultural influences, and geographic location impact on questions of access and, thus, of social inclusion. This paper reports on findings from the *Teen Reading in the Digital Era: Platforms, Access, and Diversity* research project (2016) which investigated Australian teenagers' use of print and digital platforms for recreational reading, particularly the reading of books. Since e-reading devices such as Tablets, and eReaders, have been popularly adopted only in the last few years, there exists little research about how teenagers use them to source, access, and read books. The project's decision to focus on print books, e-books and other long form reading as a point of departure was intentional, since long form reading shows the closest association with school success and vocational outcomes in later life (Baer et al. 2007; Sullivan and Brown, 2015; Zasacka, 2014).

The Teen Reading study, undertaken by a team from Deakin and Murdoch Universities, was funded by grants from Deakin University and the Australian Copyright Agency Ltd through its Cultural Fund.

Earlier papers from this study used survey data to investigate the demographic contexts that influence young people's book reading (Rutherford, Merga and Singleton 2018), and qualitative data to analyse the cultural influences and relationships that inform how teenagers discuss their leisure reading (Merga, McRae and Rutherford 2017). The current paper seeks to address the relationship between digital device use and young people's reading engagement.

Literature Review

Benefits of recreational book reading

Research has established that regular recreational reading is associated with a number of literacy and citizenship benefits (Clark 2013; Rutherford et al. 2017). The advantages of regular reading extend beyond reading literacy, with regular reading also associated with better performance in mathematics as well as English (Sullivan and Brown 2015). Jeffrey Wilhelm (2016) argues further that literacy is essential to citizenship as well as learning. The practice of reading literary fiction has been correlated with the development of empathy, understanding of others, and interpersonal skills (Kidd and Castano 2013; Oatley 2016). Motivating more reluctant readers to engage more frequently in recreational reading is, thus, a crucial challenge for librarians, teachers, and parents.

The reading of books and other 'long form' texts (Baron 2015) is more consistently associated with literacy development than of other types of 'short form' texts, such as email, social networking sites (SNS) or text messages (SMS) (Pfof, Dörfler, and Artelt 2013). Studies have established that reading email and SNS is negatively associated with performance in reading, positing that the type of reading practice associated with these short-form texts is markedly different than conventional book reading (Pfof et al. 2013; Zebroff and Kaufman 2016).

Digital literacies, digital devices and reading

Digital platforms have become so central to twenty-first century education and culture that 'it is by now a cliché to claim that digital technologies are redefining reading and literacy in education and learning' (Mangen and van der Weel 2016, 116). However, the assumption that all adolescents prefer to read digitally is increasingly challenged by researchers (Bennett, Maton, and Kervin 2008; Bittman et al. 2011; Helsper and Eynon 2010). Marc Prensky's proclamation of the fundamental differences between 'digital natives', those who grew up with the internet, mobile phones and other forms of modern technology, and 'digital immigrants', who were introduced to these technologies later in life (2001, 1-2; 2011), has had a significant impact on the way academics and educators think about adolescents and electronic books or e-books. Prensky's polemic polarization of the two groups, and the ensuing debate about the need for educational reform, has been criticized by other researchers, who suggest that it 'can be likened to an academic form of a 'moral panic'' (Bennett et al. 2008, 786). They warn that generalizing children, adolescents and young people as 'a homogenous generation with technical expertise and a distinctive learning style' (2008, 783) is as risky as refusing to change educational and social practices to meet up with technological progress.

Depending on their gender, parental socio-economic positioning (SEP), educational capital, and home resources, the informational literacy of 'digital natives' may differ widely (Fraillon, Schulz, and Ainley 2013), with studies concluding that most young people require training to support their digital literacy skills (Harrison 2016; Leonard et al. 2016). Similarly, e-reading devices require varying degrees of competence in order to purchase e-books, borrow titles from libraries, and to negotiate the differing file types appropriate to each reading-capable device. (Leonard et al. 2016). Research has found that the cognitive processes involved in

reading on screen and in print differ (Liu 2005). Conversely, screen-based reading devices can provide support that print books lack. They facilitate enlargement of text, access to dictionaries, or even text to speech capabilities to provide support for less capable readers (Larson 2010; Mackey and Shane 2013).

While digital natives leverage a wider range of technological skills than previous generations at school, teenagers' preference for specific technologies over traditional print media for recreational reading has not been clearly established. Recent studies have shown that many youth librarians believe that adolescents have no interest in e-books (Gray and Howard 2017), however, evidence from representative samples of readers is scant (Rutherford et al. 2017). Empirical and experimental studies have demonstrated that devices with e-reading capabilities do not necessarily prohibit pleasurable immersion in narrative. They may also enhance some kinds of access. Devices such as the Amazon Kindle can make the reading experience easier for students with special needs because of the interactive display settings, while other digital features make the reading experience more interactive and engaging (Larson 2010, 16). Yet, as Andrea Ballatore and Simone Natale write, the 'emergence of e-books and e-readers' has been 'a series of faltering starts and uneasy acceptances' with readers defending paper books for their versatility, supposed 'naturalness' and physical properties such as their smell or touch (2016, 2381-2383). Zhang and Kudva (2014) investigated why readers of both paper books and e-books choose one over the other at different times, finding that printed books were preferred for reading to a child and sharing books with other people, and e-books considered superior for quick access and reading on the move.

Young people's access to digital devices has grown rapidly in the past five years, at home and at school. A survey of Australian and New Zealander librarians found an increased uptake of e-books in Australian schools between 2014 and 2015

with potential implications for the resourcing of e-book over printed book collections (Softlink 2015). Assumptions about teenagers' preferences ahead of empirical evidence have, in the past, led to some schools removing traditional paper books completely (McKerracher 2009). Public libraries demonstrate increasing commitment to e-book lending. The Australian Library and Information Association's (ALIA) 2015 survey reported that e-books account for approximately 3.5 per cent of the total for public library book collections (ALIA 2015, 2), with 99 per cent of libraries loaning e-books. However, simply addressing digital access to content (books) while endorsing simple generalizations about adolescents' digital literacy capabilities and access to appropriate devices, may run the risk of limiting digital inclusion, specifically inclusion in a reading culture.

Digital inclusion and libraries

The concept of social inclusion recognizes the differences in cultural and economic capital that exclude groups and individuals from participating fully in society (Lloyd, Lipu and Kennan 2010; Mossberger, Tolbert and McNeal 2008; Warschauer 2004). Due to the increasing 'mediatization' of political and social life (Krotz 2017; Strömbäck 2008), digital media increasingly functions as intermediary for the processes of information retrieval, government and business service provision, and other forms of cultural and political participation (Helsper 2012; Jaeger et al. 2012).

Libraries have long taken a leading role in the provision of access to technological and network infrastructures to their communities (Real, Bertot and Jaeger 2014). Early discourse on digital exclusion focused on the notion of the 'digital divide', defined as the gap, 'whether based in socioeconomic status, education, geography, age, ability, language, or other factors' (Jaeger et al. 2012, 3) between those with access to digital infrastructures and the internet, and those without.

According to Beyene, discussions of inclusion and libraries have often prioritized 'physical access to information and communication technologies and digital literacy' (2018, 124). Public libraries have remained a primary source for computer and high-speed internet access for well over a decade (Real et al. 2014). Beyond access, however, researchers and practitioners recognize a need to provide training in digital literacy, acknowledging the educative needs of library users for whom the skills and competencies needed to make use of digital affordances constitute a second digital divide (Real et al. 2014). Helsper (2012) has argued that digital inequalities, based not only on socioeconomic position, but a range of other cultural factors, have resulted in the formation of a digital underclass. (see also Ragnedda 2017). Digital inclusion may be advanced, therefore, by policies, services and infrastructures that facilitate social participation through a provision of digital access, including access to digital devices, and by remediating gaps in digital literacy.

Public libraries have historically been charged with promoting literacy in their communities, and youth reading engagement is a priority for Australian institutions such as the State Library of Victoria's Centre for Youth Literature (CYL 2014) as well as librarians invested in youth service provision more broadly. It has been suggested that inclusion in a reading culture may be promoted by access to digital channels for literary sociability, such as the *Inside a Dog* website (2018) hosted by the Centre for Youth Literature referred to above. (McShane 2011). Digital search engines and library collections - both physical and e-libraries - provide access to *content* in the form of books and e-books. Indeed, e-books and e-lending, it has been suggested, have the potential to remediate exclusion in a cohort - adolescents - for whom access to bricks-and-mortar libraries is difficult due to geographical or mobility issues, or the scheduling constraints imposed by school or work demands (ALIA, 2015). In our current paper, questions of platform access and reading

engagement are explored through a detailed focus on the use of digital devices, and participation in e-book reading, in a sample of young Australians.

Research Questions

Library strategies to increase support for digital platforms and to increase the range of content supplied by digital libraries, should not, however, be conflated with evidence about teenagers' increased digital literacy proficiency or a shift in preferences on the part of young people toward reading recreationally in digital formats. Given the benefits associated with reading for pleasure, it is crucial for librarians, teachers and parents to understand whether access to e-reading devices enhances reading frequency, and whether the motivation of less engaged, as well as 'avid' readers, is increased by promoting their use. There is a need for current Australian and international research to ascertain adolescents' preferred reading modalities, and to ensure that resourcing decisions by educators, institutions and parents do not mistakenly threaten their access to their preferred reading choices.

This research investigates the following research questions:

- (1) Do digital devices constitute a preferred modality for Australian adolescents' recreational reading?
- (2) Are digital devices with e-reading capabilities associated with more reading engagement by 'avid' and 'reluctant' readers?

The paper's findings suggest that Australian adolescents' preferences for e-books, as measured from our sample, have been largely overestimated.

Resourcing decisions that preference e-books may therefore deny young people access to their preferred reading modes and do little to promote the practice of regular reading for pleasure.

Project rationale and approach

The Teen Reading study used a mixed-methods design, with data collected concurrently. The 'numeric' (survey) and 'narrative' (semi-structured interview) instruments draw upon each other to cross-validate findings (Creswell and Plano Clark 2011). As Teddlie and Tashakkori (2009) note, such mixed-methods approaches are increasingly finding favour in the social sciences. This paper reports only on the quantitative findings, as these are most appropriate to the research questions that it addresses.

Sample design, participants and procedure

The survey was administered to teenagers in schools in Western Australia and Victoria. These states were chosen because of convenience to the study's researchers, given the limitations of a one-year project. (Data collection in a third territory was initially projected, however its Department of Education refused ethics clearance to recruit school-age participants due to participant burden on its heavily-researched school population.) Given the prohibitive expense of obtaining a random sample of the teenage school population, an alternative, yet still broadly representative, approach to sampling was adopted. The survey features a cluster design based on geographical location of schools (metropolitan, outer metropolitan, regional and rural) within both states. As has been argued (Soloff, Lawrence, and Johnstone 2006), a clustered sample design (by area) provides advantages in facilitating the opportunity to gather multiple observations within a geographical community, increasing the capacity of the study to suggest community level effects.

Within these regions, schools were carefully selected so as to represent the spectrum of socio-economic disadvantaged to advantaged schools using Index of Community Socio-Educational Advantage (ICSEA) data obtained from the

Australian MySchool database (ACARA 2016). The sampling design ensured the representation of a diverse range of community socioeconomic advantage, geographical locations, and percentage of students from non-English-speaking backgrounds. The mean ICSEA for the sample schools was 997.46, with scores ranging from 942 to 1043. The sample is also broadly representative of the diversity of the Australian secondary school population in its proportion of Indigenous students (2 per cent): and students from non-English speaking backgrounds (17 per cent). Fifty-one per cent of the sample were female, 45 per cent male and 2.5 per cent did not answer that question.

Thirteen schools were recruited to participate in late 2016. The study was granted ethics approval from the researchers' universities, and the states' departments of education. Both the survey and interview instruments were piloted in Victorian secondary schools ahead of the main data collection. As a result, changes were made to the survey questionnaire, primarily concerned with provision of additional options associated with participants' use of digital platforms. Consent procedures consistent with university and state departments of education human ethics guidelines were followed. A more detailed account of the study's methodological rationale and approach is found in (Rutherford et al. 2018).

From each of the 13 participating schools, one of the following classes, Year 7 (age 12-13 years): Year 9 (14-15 years) and Year 10 (15-16 years) were selected to be surveyed. The majority of the sample fell within the age-range of 11-16, while a Year 8 class had to be substituted for convenience at two schools. Most participants were drawn from unstreamed classes. The final survey dataset consisted of 555 students. Except in cases of IT infrastructure constraints, the survey was completed at school using Qualtrics online survey software and exported into SPSS for analysis.

Analytic rationale

The data reported here were collected using non-probability methods. They do not, therefore, meet the criteria for randomness required for the calculation of inferential statistics (Blair, Czaja, and Blair 2013, 94; Callegaro, Manfrea and Vehovar 2015). Given that it is impossible to calculate sampling error for non-probability samples, our approach avoids using p-values (a measure of sampling error) as a guarantee of 'statistically significant' findings, in line with the APA's recent statement about this matter (Wasserstein and Lazar 2016). Instead we report on the character and magnitude of relationships between variables. Our study aimed at a snapshot of a population. The population was not surveyed repeatedly to ensure consistency of results (reliability), since we did not aim to develop a purposive scale designed for later use in interventions.

Results

Device access and frequency of recreational reading

To discern whether digital devices with e-reading capacities formed a major element in adolescents' recreational reading practices, it was first necessary to calculate the proportion of the sample with regular access to dedicated e-readers, tablets, phones, and desktop/ laptop computers. We then analyzed the frequency of reading on these devices to provide a snapshot of the relationship between device access and utilization for recreational reading. Table 1 below shows the results for dedicated e-readers, such as Kindle, Kobo or Nook.

[Insert Table 1 - Access to an e-reader and Frequency of Reading]

Only 23 per cent of the sample had access to a dedicated e-reader, making this the device least accessible to teen readers sampled. But those with access did not necessarily utilize it for pleasure reading: 31 per cent did not read at all, 53 per cent read occasionally, and only 15 per cent reported frequent reading. As Table 2, below, indicates, when we compare this use pattern to that of tablets, access to the latter is much higher (86 per cent) –but the proportion of those reading occasionally is lower (36 per cent of those with a tablet) as is the proportion reading frequently (10 per cent) on their devices.

[Insert Table 2 - Access to a tablet computer and frequency of reading]

The proportion of those who do not read at all on their tablets (54 per cent) is much higher than for e-readers, which is indicative of a very different use profile for the multipurpose device.

Most of the sampled teens had regular access to a desktop or laptop computer (90 per cent). As Table 3 shows, however, three-quarters of those with a computer (75 per cent) 'do not read at all' on the heavier and less portable devices. Around 20 per cent report reading occasionally for recreation, while the percentage reading frequently (4 per cent) is significantly lower than that reported for dedicated e-reading devices.

[Insert Table 3 - Access to a desktop or laptop computer and frequency of reading]

Mobile phones are also multipurpose devices; however, the usage profile for recreational reading is different in a number of respects from tablets.

[Insert Table 4 - Access to phone and frequency of reading]

While those reporting frequent reading on their phones is similar to tablet users (10 per cent), there are significantly more who 'do not read at all' on their phones (71 per cent), and fewer are inclined to read occasionally (19 per cent). Interview data from selected teenagers in our sample indicates that some of the phones available lack e-reading capabilities, but as suggested above, screen size may also be a factor.

Associations between reading engagement intensity and volume of e-book reading

While these descriptive statistics provide a general map of reading behaviours, they do not allow us to compare the degree of general reading engagement with preference for reading books on digital platforms. We developed a short scale to measure reading engagement, combining individual measures of reading frequency and volume (Rutherford et al., 2018). A series of measures of reader behaviour potentially provides detail but may hide underlying tendencies that are more revealing in bivariate analyses. Measures of reading volume can fail to take into account both book lengths and the complexity of their language and narrative challenges. Each of our initial measures (minutes per day spent reading, days per week when reading occurs, and the volume of books consumed on a monthly basis) provide insight into adolescents' volume and frequency of long form reading, which can be defined as reading engagement intensity. (The survey questions from which our measures were derived are summarised in the Appendix).

To leverage this underlying concept we combined the individual measures into an overall measure of engagement intensity by creating a scale of these items, and then trichomotizing that scale for categorical analysis (Rutherford et al. 2018).

Performing a reliability test in SPSS demonstrated high correlation between the items of the scale (Cronbach's Alpha = 0.875), thus confirming the validity of the construct as indicated by consistency across all the measures of reading. A frequency analysis of the reader scale was conducted, and the respondents were divided into three categories of engagement intensity: 'Light', 'Moderate', and 'Heavy'. 'Light' reading engagement could be broadly equated with 'reluctant' readers: those who read very little for pleasure, or only for class activities. 'Heavy' reading engagement intensity, by comparison, would comprise that category usually described as 'avid' or 'prolific' readers. They read regularly for pleasure, often on a daily basis, and consume a large volume of books per month. Forty-two per cent of the sample were Light readers; 36% were Moderate and 21% were Heavy.

Table 5 and Figure 1, below, show the correlation between reading engagement intensity and books read per month on digital platforms. In the tables and charts that follow, we retain in the analysis those who don't own a suitable device. This helps illustrate the relationship between *access* to suitable devices and reading intensity.

[Insert Table 5]

[Insert Figure 1]

A strong association is indicated between reading engagement intensity and tendency to read books on digital devices. 22 per cent of 'lightly' engaged readers do not read any e-books on a monthly basis, with only 3 per cent reading three or more. The reverse holds true for 'heavy' readers. 24 per cent report reading three or more digital books per month, while 12 per cent read none. Interestingly, within the category of 'moderately' engaged readers, 9 per cent read three or more e-books per

month. This somewhat higher than expected percentage is probably attributable to the skip logic deployed in the survey instrument such that only respondents indicating that they read on digital devices were asked this question.

Use profiles of different platforms - results with brief discussion

The four devices with e-reading capabilities about which we have data - dedicated e-readers, tablets, laptop/desktop computers, and phones - can be seen to show different access and use profiles. As Anne Mangen emphasizes, there are differences between e-readers that use e-ink that mimics ink on paper for a more comfortable reading experience, and tablets, such as the iPad, with a backlit screen like a computer and maximum potential for distraction as a 'so-called "do-it-all" device' (2016, 244). The healthy proportion of those reading occasionally on tablets (36 per cent) - over one-third of those asked the question - also suggests that wide access - perhaps combined with the affordances of screen size - facilitates use of tablets for recreational reading.

Table 6 shows that the proportion of those with access to tablets is spread fairly evenly between the three intensities of reading engagement ('Light' = 84 per cent; 'Moderate' = 90 per cent; 'Heavy' = 86 per cent).

[Insert Table 6]

Access to mobile phones ('Light' = 99 per cent; 'Moderate' = 85 per cent; 'Heavy' = 87 per cent) and laptop/desktop computers ('Light' = 90 per cent; 'Moderate' = 90 per cent; 'Heavy' = 94 per cent) is also more evenly distributed between the three reading engagement categories (see Tables 7 and 8).

[Insert Table 7]

[Insert Table 8]

This degree of penetration reflects the prevalence of tablets and laptops in classroom and entertainment uses. As Chen et al. explain tablets have 'become a popular educational technology' which blend 'the features of laptops, smartphones' with always-on internet access and 'thousands of apps with which to personalize the experience' (2014, 214). It has been noted that there has been an increased 'prevalence of Bring Your Own Device policies and 1-to-1 computer to student ratios in both public and private schools in recent times' (Merga and Mat Roni 2017, 8).

Comparing tablets to dedicated e-reader devices we see that access to e-readers is much lower, and skews slightly towards those with higher reader engagement intensity ('Light'=17 per cent; 'Moderate'=25 per cent; 'Heavy'=24 per cent) (see Table 9). While only 23 per cent of our sample had regular access to dedicated e-readers, *of those with access*, 78 per cent utilized their device for book frequently or occasionally, as opposed to 46 per cent of tablet users. It is likely that those with access to dedicated e-readers already possess a strong reading ideation themselves or are supported by a family investment in reading that extends to the purchase of dedicated technology.

[Insert Table 9]

Discussion

Major findings – do devices promote reading engagement?

Our first research question asked 'are digital devices a preferred modality for Australian adolescents' recreational reading'. Based on our sample, the data show

that this is not the case. With the possible exception of dedicated e-readers like the Kindle, all the digital devices with e-reading capabilities were under-utilized for reading by the teenagers in our sample. With our second research question we sought to understand whether digital devices with e-reading capabilities were associated with higher reading engagement by 'avid' or 'reluctant' readers. Our findings indicate that technology, of itself, does not shape reading motivation – those with higher reading engagement read more books in general, and thus, more books on digital devices. As shown in Table 5, a cross-tabulation of the volume of e-books per month read on any digital device by respondents' reading engagement intensity indicated that those with higher reading engagement were most likely to read the most e-books. However, their preferred modality remained print. There is a considerable percentage of those with higher levels of reading engagement intensity who read no e-books at all in an average month ('Moderate' = 24 per cent; 'Heavy' = 12 per cent). These findings show that even those usually considered 'avid' readers may avoid the use of digital devices for reading.

Digital platforms do not of themselves seem to motivate more reluctant readers either. This contests findings from some earlier international research suggesting that some cohorts of readers are consistently more enthusiastic about reading on devices in preference to print books (Miranda, Williams-Rossi, Johnson and McKenzie 2011; OECD 2011; Tveit and Mangen 2014). In Tveit and Mangen's Norwegian study, year 10 students read a novel over two mediums (print and a Sony e-reader). Self-professed avid readers were found to prefer paper books but reluctant readers – the vast majority – preferred e-books. However, the study explicitly recruited one of the participating schools because of its publicized interest in promoting digital technology (Merga 2015) which may have skewed its results. Our study of this sample of Australian teenagers found that, while access to a device

was associated with higher *occasional* reading frequency by those with 'light', 'moderate', and 'heavy' reading engagement, computers and internet-enabled phones and tablets also exhibited a larger proportion of respondents who did not utilise these platforms at all for reading.

Issues for library policy

Digital Inclusion

Public and school libraries promote the expansion of digital libraries for a number of reasons, including provision of access to remote borrowers, together with issues of resource management. According to recent Australian research, the resources devoted to digital library acquisition vary considerably, from as much as 80 percent to as little as 6 percent (Yu and Moreno 2014, 51). However, as an ALIA report comparing e-lending in Australian public libraries found, despite e-books comprising only 3.5 per cent of the total for public library book collections in 2015, upward trends were discernable from previous surveys (2015, 2).

Despite the high cost of introducing e-lending infrastructure (ALIA 2014; 2015), libraries have embraced the manifesto that provision of e-books for recreational reading is vital to the maintenance of a 'reading culture' (BICC 2013, 34). The drop-off in library attendance when young people reach their busy adolescent years has long been documented. However, policy discourse regarding service provision for young people that frames the teenage reader in terms of the 'digital native', in all cases preferring information and services delivered digitally, may disadvantage many. Gray and Howard's survey of North American public librarians identified the perception that help guides linked to social media would be the preferred solution for most teens (2017, 6).

E-book collections and e-lending infrastructure have become a commonly cited solution to problems associated with adolescent access, remediating barriers such as distance from the physical library, mobility issues, or institutionalization (ALIA 2015; Gray and Howard 2017). But digital libraries may pose barriers for discovery of engaging recreational reading material. Research has noted that such collections do not facilitate 'browsing', a traditional search strategy in physical collections. As McKay et al. (2017) explain, the issue with information retrieval is that users need to know what to ask for ahead of searching. In the case of e-lending services, this is clearly not the case for many potential teen readers. Recognition of this has seen resources devoted to the visual design of interfaces to improve the discoverability and attractiveness of digital collections.

An increasing number of Australian and international public libraries are embracing e-lending (ALIA 2015). However, research from our sample indicates that many Australian teenagers are not aware that public libraries offer young adult e-books for lending. Qualitative comments indicate that many are either: not aware of these collections; do not possess the digital literacy skills to negotiate often complicated user interfaces; or, consider the effort involved in digital participation too burdensome when physical collections can be accessed readily (Rutherford and Johanson 2017). Assumptions about the intrinsic familiarity with, and enthusiasm for, digital platforms by 'digital natives' or 'millennials' (Considine, Horton and Moorman, 2009; Howe and Strauss, 2000) need to be monitored and reassessed. As Fraillon et al. (2013) usefully remind us, the informational literacy of young adults differs considerably. Most young people therefore require training to support their digital literacy (Harrison 2016; Leonard et al. 2016). For libraries, this suggests that digital literacy training to aid in the discovery and access of e-book titles, and the

protocols required to negotiate differing formats, could be effective. While Gray and Howard (2017) indicate that programs of this kind are frequently available in North American libraries, in Australia this is much rarer. Public library websites routinely promote the availability of the e-book resources they have licenced or purchased, however borrowing is acknowledged in most cases to be a complicated process (Yu and Moreno 2014). Our research indicates that this is a significant barrier for some teenage users. In addition, dedicated youth programming to provide adolescents with appropriate training would appear to be rare. Gray and Howard document the practice in the North American libraries they surveyed, reporting mixed success (2017). Nevertheless, given indications of the barriers that prevent teenagers accessing e-collections, there may be a benefit in public and school libraries including digital literacy as part of regular youth programming.

Device Support

Despite advocacy for device-neutral e-books (BICC 2013), the disconnect between device access and available file formats remains an issue for many library patrons. While this is a lesser problem in the US, where public libraries have been successful in negotiating access rights to Amazon titles they have licensed (Overdrive Help 2017), the market penetration of the Kindle e-reader in Australia among young people, for example, is not matched by an ability to borrow digital texts suitable for this device from public libraries. This is the case in most other nations outside North America. Devices that use the more standard EPUB format can only be converted for the Kindle through third-party software workarounds (Nicol 2017; Segan 2015) that demand high levels of ICT literacy. Our research indicates that while tablet computers and smart phone access is more ubiquitous, owners of dedicated e-reader devices, dominated by the Kindle platform, are proportionately more likely to be frequent readers. Most Australian libraries use more than one

distribution platform, however there is no support for the Kindle, with the exception of the newer Kindle Fire, which uses the Android operating system. Following US practice, there is now a trend for Australian libraries to lending devices, as well as e-books (ALIA 2015). Our findings suggest that libraries might consider lending dedicated e-reader devices capable of supporting the EPUB format to young patrons who are currently unable to access the file formats provided in their digital collections.

Resourcing a Diverse Physical Collection

Our study shows that print is the most accessed platform for all categories of readers, from those with high reading engagement to those who might be considered infrequent, or even reluctant, readers. Those with high reading engagement read more, and more frequently. They are also more likely to read on digital devices than less engaged adolescents. However, even 'avid' readers exhibit a preference for print as a recreational reading modality. This in no way discounts the affordances offered to young adults by e-books. Devices with e-reading capacities offer many attractions to adolescents. As one researcher explains, e-readers such as the Amazon Kindle and Sony Reader can make the reading experience easier for students with special needs because of the interactive display settings, while other digital features make the reading experience more interactive and engaging (Larson, 2010, p. 16). Other benefits include the ability to transport a large collection of books easily, to purchase additional titles instantly regardless of access to bricks-and-mortar bookshops (Macfadyen, 2011). E-readers also facilitate a degree of privacy when reading in public, hiding reading tastes that may not confer social approval from observers (Bosman, 2010).

Confirming the perceptions documented in a recent study of youth librarians (Gray and Howard 2017), our data shows that print is preferred by most of the

sampled adolescents for their leisure reading. Given this preference, the development and maintenance of diverse, carefully curated, young adult collections should be balanced against trends to increasing shifting of resourcing to digital libraries. Diversity, in this context, indicates consideration of diverse genres, story types, life experiences, media and narrative voice, and is not merely defined in the context of identity politics. A recent Victorian case study found that circulation statistics for adolescents improved when strategies for informed, curation of collections led by youth librarians were employed (Derr 2017).

Conclusion

Teenagers are not homogenous; therefore multiple strategies are necessary to improve their engagement with reading culture. The assumption that to be responsive to the preferences of millennials, e-books and device-based reading should be given priority in school and public library collection development may have detrimental effects on adolescents' enthusiasm for reading on a regular basis, thus curtailing their access to important educational and social benefits. This is of concern, because there is some research to suggest that recreational reading may be in decline internationally. Scholastic's 2015 *Kids and family reading report* (2015) indicates that the number of US children reading for pleasure declined by 10 per cent in the previous four years, while recent empirical studies in Australia confirm that few children and adolescents are committed and regular book readers (Merga 2014; Rutherford et al. 2018).

Pressure to respond progressively to young people's supposed preference for reading modes has the potential to influence libraries to pursue e-preferred collection development strategies. Parents may also succumb to marketing pressure which

positions digital devices, particularly tablets, as beneficial educational and entertainment tools. Tablets have become a prevalent technology in educational settings as reading devices, as 'book-like device[s] with great portability, usability, and interactivity' (Chen et al. 2014, 216). Our research indicates that Australian adolescents' preferences for e-books has been popularly over-estimated. Resourcing decisions that prioritize digital over print collection development may deny young people access to their preferred reading modes and do little to promote the literacy- and citizenship-enhancing practice of regular pleasure reading, reading pleasure, or the generational renewal of a reading culture.

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Table 1

Access to an eReader (e.g. Kindle, Kobo, Nook) and Frequency of Reading

	N	%
<i>Has regular access to eReader</i>		
Yes	130	23%
No	421	76%
Missing	4	1%
Total	555	100%
<i>How often reads on eReader</i>		
Not at all	40	31%
Occasionally	69	53%
Frequently	20	15%
Total (those with an e-reader)	130	100%

Table 2

Access to a tablet computer (e.g. iPad / Android) and frequency of reading

	N	%
<i>Has regular access to tablet</i>		
Yes	477	86%
No	73	13%
Missing	5	1%
Total	555	100%
<i>How often reads on tablet</i>		
Not at all	258	54%
Occasionally	170	36%
Frequently	49	10%
Total (those with tablet)	477	100%

Table 3

Access to a desktop or laptop computer and frequency of reading

	N	%
<i>Has regular access to computer</i>		
Yes	502	90
No	47	9
Missing	6	1
Total	555	100%
<i>How often reads on computer</i>		
Not at all	377	75%
Occasionally	103	21%
Frequently	22	4%
Total (those with a computer)	504	100%

Table 4

Access to a mobile phone and frequency of reading

	N	%
<i>Has regular access to phone</i>		
Yes	482	87
No	67	12
Missing	6	1
Total	555	100%
<i>How often reads on phone</i>		
Not at all	343	71%
Occasionally	90	19%
Frequently	49	10%
Total (has access to phone)	482	100%

Table 5

eBooks read per month by Reader Engagement Intensity

		LIGHT	MODERATE	HEAVY	TOTAL
0 eBooks read	N	52	48	14	114
	%	22%	24%	12%	21%
1-2 eBooks	N	23	56	36	115
	%	10%	28%	31%	21%
3 or more eBooks	N	8	17	28	53
	%	3%	9%	24%	10%
Not asked/doesn't own suitable device	N	152	77	40	269
	%	65%	39%	34%	49%
Total	N	235	198	118	551
	%	100%	100%	100%	100%

Figure 1. eBooks Read per Month by Reader Engagement Intensity

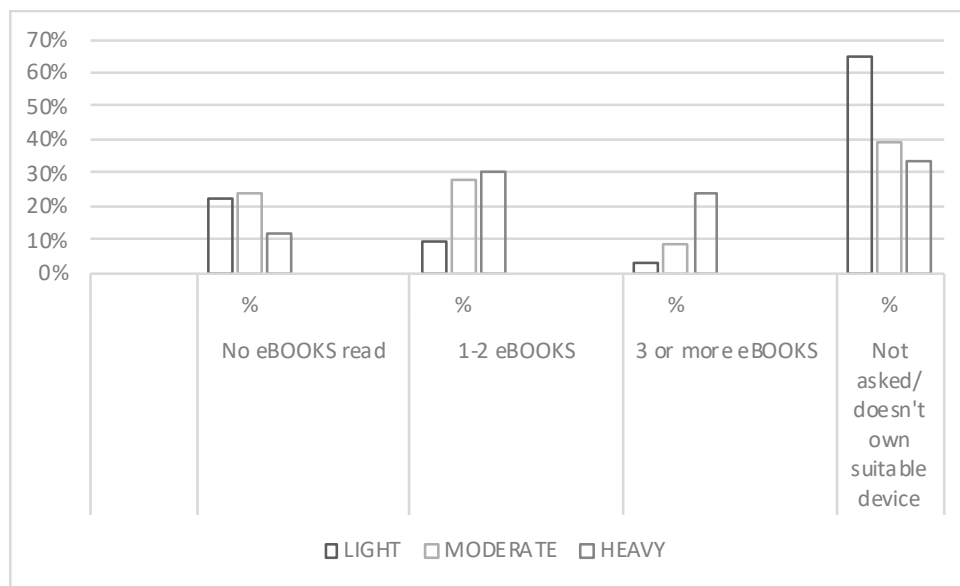


Table 6

Access to Tablet by Reader Engagement Intensity

		LIGHT	MODERATE	HEAVY	TOTAL
Yes	N	197	178	102	477
	%	84%	90%	86%	87%
No	N	38	19	16	73
	%	16%	10%	14%	13%
Missing	N	0	1	0	1
	%	0%	1%	0%	0%
Total	N	235	198	118	551
	%	100%	100%	100%	100%

Table 7

Access to Mobile Phone by Reader Engagement Intensity

		LIGHT	MODERATE	HEAVY	TOTAL
Yes	N	210	169	103	482
	%	89%	85%	87%	88%
No	N	24	28	15	67
	%	10%	14%	13%	12%
Missing	N	1	1	0	2
	%	0%	1%	0%	0%
Total	N	235	198	118	551
	%	100%	100%	100%	100%

Table 8

Access to Laptop/Desktop Computer by Reader Engagement Intensity

		LIGHT	MODERATE	HEAVY	TOTAL
Not at all	N	188	122	67	377
	%	80%	62%	57%	68%
Occasionally	N	23	45	35	103
	%	10%	23%	30%	19%
Frequently	N	1	11	10	22
	%	0%	6%	9%	4%
No computer	N	23	20	6	49
	%	10%	10%	5%	9%
TOTAL	N	235	198	118	551
	%	100%	100%	100%	100%

Table 9

Access to eReader by Reader Engagement Intensity

		LIGHT	MODERATE	HEAVY	TOTAL
Yes	N	41	50	39	130
	%	17%	25%	33%	24%
No	N	194	148	79	421
	%	83%	75%	67%	76%
Total	N	235	198	118	551
	%	100%	100%	100%	100%

Appendix 1: Survey Questions and Analytic Measures

Measures used in the analysis

Frequency of any long-form reading (platform independent). Participants in the survey were asked:

1. 'On an average day, how much time do you spend reading books you choose for yourself?' ('Less than 15 minutes' / '15-30 minutes' / '31-60 minutes' / 'More than 60 minutes' / 'I do not read daily'). For the purposes of this question, books were defined as 'both regular printed books and online books or eBooks (such as pdf, ePub and mobi files)'. Comics, magazines and newspapers were specifically excluded.
2. 'On an average week, how often do you read books you choose for yourself?' ('1-2 days per week' / '3-4 days per week' / '5-6 days per week' / 'I do not read weekly').

Volume of long-form reading (platform independent). In addition to frequency, we sought information about the volume of long-form reading young people engaged in overall, since number of 'books' read per year has been found to impact measures of reading attainment (Clark and Poulton 2011). We asked:

1. 'In an average month, how many books do you read for recreation?' ('0' / '1' / '2' / '3' / '4 or more').

Volume of long-form reading (on digital platforms). Participants were asked:

1. 'In an average month, how many e-books do you read for fun on digital devices?' ('0' / '1' / '2' / '3' / '4 or more').

Access to digital devices with e-reading capabilities. Participants were asked:

1. *whether they had regular access to the following e-reading devices: 'eReader (such as Kindle, Kobo or Nook)'/ 'Tablet (such is iPad, Android, etc.)'/ 'desktop or laptop computer'/ 'mobile phone'. ('Yes'/'No')*

Frequency of reading on digital devices. The survey employed a skip logic. Participants indicating 'regular access' to any of the four digital devices listed in the previous measure, were asked the following:

1. How often do you read books on your [device name]? 'Not at all' / 'Occasionally' / 'Frequently'.