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Contents

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Executive summary

While the use of internet search engines for research has flourished in recent decades, we are still learning about how teachers can best support students in using these tools effectively. Understandably, the Australian Curriculum requires students to become adept at investigating with ICT during their school years. In this paper, Renee Morrison discusses much research, both Australian and international, that suggests many students are poorly informed about the function of search engines. They lack the metalanguage required to discuss their engagement with internet search and rarely adopt a proactive role in their search for information, often limiting the resultant educational benefits. She argues that passive involvement is of concern for a number of reasons, including the commercially driven bias of search engines such as Google; the dispersal of misinformation; and users' predilection to believe that search engines are an indisputable fount of knowledge.

The article includes the review of a comprehensive range of research regarding a 'search skill deficit' amongst school students and regarding the relationship between language (or discourse) and online search. In addition, Morrison's own studies confirm a need for concern about the ways students engage with search engines. She claims that a greater understanding of the metalanguage relating to internet searching and effective discourse between educators and students about online search activities can cultivate strategies leading to 'deep-level' search practices.

By using the analogy of driving a car, Morrison asserts that students should be encouraged to play an active role when searching, and 'drive' their search engine. She suggests that teachers can better cultivate effective use of online search tools by:
- modelling metalanguage and its use
- modelling critical thinking surrounding online search and its functions
- teaching students to script and rescript appropriate search queries
- explaining the significance of domain extensions such as .com, .edu, .gov and .au
- teaching criteria for evaluating websites.

For those seeking more detail on cultivating effective use of internet search engines, the following article provides a significant selection of research literature. In addition, it recommends the explicit teaching of skills for researching using digital technologies so that students are empowered and become productive users of search engines.
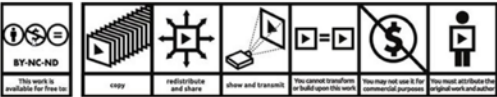
'Drowning in information while starving for wisdom'. Helping students to maximise their online searching

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Dr Renee Morrison presents a detailed analysis on students' use of ICT as an information search tool and indicates the need for explicit educational guidance and discourse in this activity.

According to the Australian Curriculum, by the end of Year 4, students should be able to 'use ICT to plan an information search' (ICT General Capability, ACARA, 2019). This directive reflects an understanding that our manner of accessing information increasingly relies upon digital technologies like search engines. The ability to find, comprehend and evaluate information online has likewise been repeatedly identified by the Organisation for Economic Co-operation and Development (OECD) as crucial to participation in society today (OECD, 2010). While few would debate the enormous educational potential brought about by search engines like Google, a significant body of research suggests that today's students lack the search skills to make this potential a reality (Argelagós and Pifarré, 2012; Gui and Argentin, 2011; Kammerer and Bohnacker, 2012; Quintana et al., 2012). Such research confirms my own experiences as an educator. For more than 18 years and across three continents, I witnessed firsthand a rhetoric-reality gap, not only between what online search **can** do and **is** doing for education, but between the search skills presumed of our students and those they truly possess.

In Australia, findings from the National Assessment Program – Information and Communication Technology Literacy (NAP-ICTL) assessment revealed just half (52%) of Year 10 students are able to script appropriate queries

when searching for online information (Fraillon et al., 2015). This is important given the many benefits associated with online search. Frequent online searching has been found to provide students with better metacognition (Lee and Wu, 2013) and children who search online, for fun or for schoolwork, perform better in mathematics and reading tests than those who do not (Casey et al., 2012). Benefits beyond school, including in higher education (Weber et al., 2019), are also associated with more 'advanced' online search (van Dijk, 2012). Educators and researchers alike have a vested interest in understanding more about how students search and how to improve their search activities to ensure the new educational benefits available are maximised.

Learning about and with digital technologies is increasingly understood to be a social process involving unique and telling discourses (Davidson, 2014; Eynon and Geniets, 2016; Wegerif and Major, 2019). One research agenda accordingly investigates the links between 'talk' (or discourse) and student digital practices. Some have suggested that imperative to success in many digital tasks is 'the effective use of talk scaffolds' (Major et al., 2018, p 13) and modelling 'equitable kind[s] of debate' (Mercer et al., 2010, p 370). Beyond just achieving greater success with digital tasks, educators who do this are said to experience more positive relationships with students (Bouhnik and Deshen, 2014; Maher, 2012; Major et al., 2018). Educators who forego establishing such discursive practices, by contrast, are more likely to witness unproductive digital activities with little educational benefit experienced by participants (Mercer et al., 2010). In terms of search specifically, preliminary evidence also exists of a relationship between particular types of discursive practice and positive search practices (Castek et al., 2012; Knight and Mercer, 2015). This evidence, along with increased understanding of the many benefits of online search (Casey et al., 2012; Lee and Wu, 2013) and of a search skill deficit in today's students (Argelagós and Pifarré, 2012; Gui and Argentin, 2011; Quintana et al., 2012) make the current study timely. This article reports on the following research questions:
- What types of talk (discursive practices) do students engage in during online search and during discussions of online search? (RQ1) and
- To what extent is this talk associated with search success and new educational benefits? (RQ2).

Research approach

If students can engage in discursive practices known to be correlated with search success, better learning contexts and new educational benefits can be realised. A desire to contribute an understanding of such discursive practices led to this research employing Critical Discourse Analysis (CDA). The value of CDA in educational research has been established for several decades (Gee, 2004; Luke, 1995; Rogers et al., 2005). Rogers suggests that 'in educational settings, language is the primary mediational tool through which learning occurs' (2004, p 12). Language provides educators and students with a means to share ideas and negotiate action, and language reveals what students understand and assume (Koole, 2015). Language is also a social practice through which individuals establish social identities and interpersonal relationships (Wodak, 1999). It is these language practices specifically, those determined by and determining social structures that CDA scholars are most interested in, and which they consider 'discourse' (Fairclough, 2015).

This research employed Fairclough's (2015) three-tiered model for CDA (see Figure 1). The model identifies any instance of discourse as 'simultaneously a piece of text, an instance of discursive practice and an instance of social practice' (Fairclough, 1993, p 4). Fairclough suggests texts, be they spoken or written, are more than just a collection of linguistic features and can reveal what individuals take for granted, including their knowledges, beliefs, and values. These internalised assumptions are both socially constrained and constitutive, and influence how individuals interpret discursive and social practices, including their own, even unconsciously. Fairclough's model provides researchers with tools to explore how talk is produced, how it is interpreted and the assumptions upon which this interpretation relies, as well as the social conditions making these assumptions available or privileged (Fairclough, 1993). As such, the research presented here is interested not only in how students search and talk about or during search, but in how they **interpret** what it means to search and to talk about search. Given evidence of a search skill deficit in today's students (Argelagós and Pifarré, 2012; Gui and Argentin, 2011;

Quintana et al., 2012), one which implies students might interpret online search in limited ways, the research is also interested in identifying the social conditions making these **interpretations** privileged in contemporary educational settings.
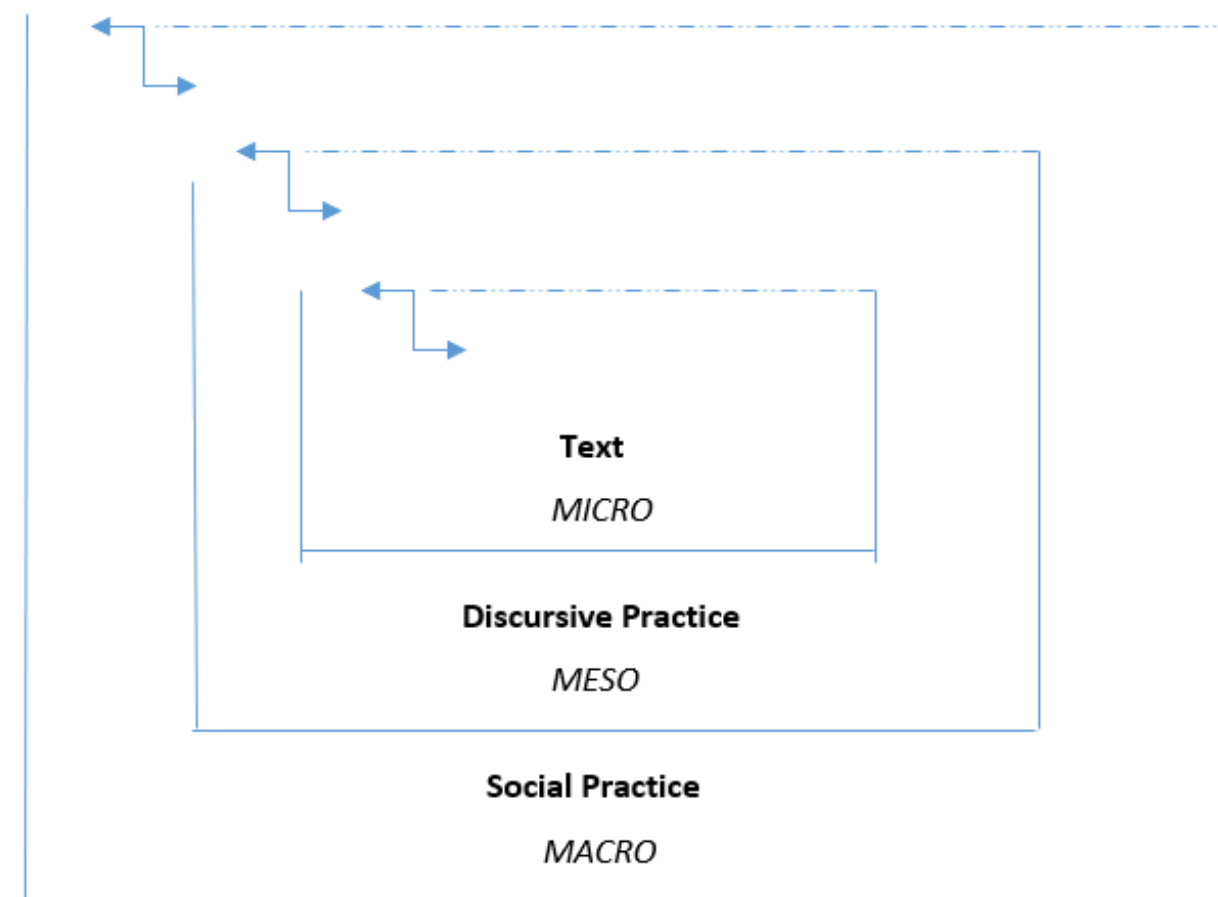
Figure 1: Theoretical and conceptual framework. Adapted from Fairclough (1993, p 73).

Literature review on the benefits of online search

Proposed revisions to the Digital literacy (previously ICT) General Capability of the Australian Curriculum (2021) include increased reference to search engines. This is perhaps not surprising given the inconceivable volume of information and educational resources they make instantly accessible. Indeed, our reliance upon online search now sees Google alone process more than 90,000 searches every second of every day (www.internetlivestats. com). In Australia, children go online both at home and at school more than children from 25 other countries, and the nation's first-time internet users are some of the youngest in the world (Green et al., 2011) and getting younger all the time (Davidson, 2011b; Green and Holloway, 2019). Students in Australia spend more than 11 hours a week online, usage which has doubled since 2008 (Roy Morgan, 2017). Such use is to be encouraged, it seems, with the Australian Government spending more than $2 billion implementing classroom digital technologies in 2014 (Beckman et al., 2014) and a further $53 billion in 2020 to increase the speed of its national broadband network (Lane, 2020, para. 19). Expenditure of this scale further reflects a broad social assumption that internet use is imperative for participating in society today.

Above and beyond the obvious educational benefits of online search, like making information freely available to anyone, anywhere at any time, research has begun to identify further reasons why educators should continue to encourage students use search engines. Lee and Wu's (2013) study of over 80,000 students (aged 15 years) found '[m]ore frequent information-seeking activities predicted better knowledge of metacognitive strategies, which in turn predicted better reading literacy' (p 168). Regarding younger students, Casey et al. (2012) found that certain Internet activities performed by nine-year-olds appeared correlated with educational benefits, while others

appeared detrimental. Online search and email, for example, were 'associated with higher reading and maths test scores' while instant messaging and downloading music were 'negatively associated' with both scores (Casey et al., 2012, p 615). This suggests that not all internet activities are equal. Research has also found that not all online search is equally beneficial. In their examination of German university students' online search, Weber et al. (2019) found that 'using advanced online information seeking strategies [wa]s a significant and robust predictor of better grades' (p 657). These strategies, those they define as 'deep-level', go beyond one-word searches on Google and beyond considering only the first page of results. Better grades, instead appeared correlated with students using complex search strategies, including adapting search terms in response to results and considering only scholarly journals or peer-reviewed information. In adults too, the online reading involved in information seeking has been found to lead to 'increased levels of in-depth reading' (You et al., 2012) while reading online to 'be social' decreased 'in-depth reading' (p 1586). Such findings complement a body of literature (Cho et al., 2003; Zillien and Hargittai, 2009) which reports that those who use the Internet for 'serious applications' are more likely to be highly benefited in terms of capital and resources, in education, social participation, and careers (van Dijk, 2012, p 69).

Problematising the benefit of online search

Although literature investigating online search spans several fields, including information retrieval, human computer interaction and educational technology, consensus is growing that search engine use is complex (Bilal, 2012; Chevalier et al., 2015; Eynon and Geniets, 2016; Foss and Druin, 2014; Knight and Mercer, 2015; Lewandowksi, 2015). Despite this understanding, and despite evidence of a search skill deficit in students particularly, 'very few investigations into children's online search have appeared in the last five years' (Vanderschantz and Hinze, 2019, p 2). Of similar concern is that educators frequently forego explicit search instruction in the classroom (Combes, 2013; Ladbrook and Probert, 2011; Morrison, 2014; Spengler, 2015; Togia et al., 2014). This might reflect what Rieh et al. (2016) describe as a problematic conceptualisation where the relationship between searching and learning, and hence the relationship between search and the benefits of search, have simply been assumed. Such an assumption is reminiscent of wider educational ideologies that consider digital participation invariably beneficial (Literat et al., 2018; Selwyn, 2010).

Rieh et al. (2016) suggest (in line with Caviglia and Delfino, 2016; and Gärdén et al., 2014) that students see search as 'a simple type-and-click operation' and are accustomed to using Google to acquire facts, not to facilitate higher order thinking. These attitudes can prove detrimental.

> … researchers warn of the immense influence search engines, particularly Google, have in terms of altering what we know and what knowledge we value …

Indeed, regarding digital integration in education, attitudes have proven more important than resourcing or even teacher skill for increasing authentic technology-enabled learning (Ertmer and Ottenbreit-Leftwich, 2010). Perhaps this is positive given many studies find that teachers themselves struggle to use online search effectively (Claro et al., 2018; Ekstrand et al., 2020) and struggle to structure (and provide support for) online search tasks for students which go beyond lower-order skills (Claro et al., 2018; Hinostroza et al., 2021). In their study of eighth-grade Finnish students and teachers, Nygård et al., (2020) found that instances during information search where the teachers' role was 'neither functional nor met the learners' needs' created tension in the classroom (p 9).

Other detrimental search habits commonly reported of students, habits likely rendering the benefits of search unattainable, include:
- using natural language queries (Foss and Druin, 2014; Georgas, 2014; Kammerer and Bohnacker, 2012);
- inadvertently clicking on advertisements (Gasser et al., 2012 ; Schultheiß and Lewandwoski, 2019) or anything positioned prominently (Duarte Torres and Weber, 2011); and
- relying on the search engine's placement of results as a measure of relevance (Bilal, 2012; Blikstad-Balas and Hvistendahl, 2013).

Young people frequently click on the first site listed almost automatically (Duarte Torres and Weber, 2011; Gwizdka and Bilal, 2017), enter few websites per topic (Nicholas, 2011) and indiscriminately utilise assistive features like Google's 'Did you mean?' function (Morrison, 2014). Far from demonstrating strong media literacy, that is a literacy said to turn online users from passive humans to active ones (Hashemi and Soltanifar, 2011), such passive practices appear to reflect a belief that the onus is on the search engine not the students when seeking information online (Georgas, 2013). Such faith in search engines not only hinders students from likely developing the vital skills needed to reap the benefits of search but affords immeasurable power to the technology. Indeed, researchers warn of the immense influence search engines, particularly Google, have in terms of altering what we know and what knowledge we value (Goldman, 2011; Hillis et al., 2013; Schroeder, 2014). This influence grows more powerful when search engines are thought of as neutral tools (Schroeder, 2014; Halavais, 2013; Lewandowski, 2015). Far from being neutral, search engines can influence not only how we seek information and the nature of that information, but how we see ourselves and our society (Hillis et al., 2013). In this way, while digital technologies like online search have long been credited with giving students and educators more power, ultimately it might be the commercial juggernauts like Google who benefit the most.

Online search and discourse - maximising the benefits of search

Greater recognition of the potential benefits of online search, and of the potential pitfalls necessitates further understanding of factors likely to improve students' use of search engines. One promising area stems from research investigating the interaction between discourse and digital technology use (Littleton and Mercer, 2013; Major et al., 2018; Mercer et al., 2010; Wegerif, 2013, 2019). Particular attention has begun to be paid to search specifically, and children's talk during search, both in the home and in the classroom.

Danby et al. (2013) utilised conversation analysis to examine a family's talk during online search. The parent in this study, like the teachers discussed earlier, forewent any search instruction and failed to draw attention to the literacies required of online search (as in Plowman, McPake, and Stephen, 2008). In 2011, Davidson also utilised conversation analysis to investigate how four families' collaboratively search in the home. Here too, it was found that Google search and the associated 'sense-making practices' were social and mutual accomplishments 'requiring more than the mere exchange of information' (Davidson, 2011, p 18). These accomplishments were not without criticism however, and included for example, children immediately choosing the first SERP (search engine results page) result. In classrooms, a relationship has similarly been found between more and less productive collaborative online searching and certain discursive practices. Castek et al. (2012) found that students who make equal contributions to the dialogue, who express their own ideas but also build on one another's and share responsibility for search collaborate more effectively. Less productive collaboration, by contrast, is marked by a lack of active listening, by the disproportionate voicing of one's own ideas and discourse 'marked by disconnected contributions' (p 488). Knight and Mercer's (2015) study into the collaborative nature of online search among 11 and 12 year olds also reports that particular discursive practices can help predict positive search experiences. They found 'the most successful pupils were those who engaged in the most exploratory talk', that is, talk where speakers 'engage critically but constructively with each other's ideas', where 'joint consideration' is given to opinions and suggestions before decisions are made, and where 'all actively participate' (Knight and Mercer, 2015, p 310).

Though to date, no research can be found that uses CDA to investigate online search and none can be found which considers both home and school-based search, the literature reviewed here helps to inform the current study. Some of the more influential findings include the following:
- that digital devices can alter the social and learning relationships available in education (Theobald et al., 2016);
- that parents take for granted their child/ren's technological proficiency (Danby et al., 2013); and
- that the 'potential of collaboration and discourse should be exploited in search-based tasks' (Knight and Mercer, 2015, p 303).

Research context and participants

The data presented here comes from two separate studies. The first was a mixed methods study conducted in 2014 by the author (Morrison, 2014). It investigated the extent to which exposing young adolescents to explicit search engine skills affected their online searching and incorporated two phases. The second phase, that which this article reports partial findings from, had five participants, all grade 8 students (three boys and two girls aged 12–13 years) attending a co-educational, government secondary school in regional Queensland. Participants in this study (Study 1), completed a search proficiency pre-test (in pairs) and individual pre-interview before participating in an intervention based upon explicit search instruction. Post-tests, paired and individual interviews, were then conducted.

The second study (Study 2) also focused upon search engine use. It explored online search in Australian home-schools and included both parent-educator (n=5) and student (aged 8-10 years) participants (n=7). More specifically, the study explored the value of the 'Generational Digital Divide' construct in helping understand home-schoolers' online search and associated discursive practices. A mixed methods research design was again adopted, incorporating two data collection phases. In the first phase, 60 Australian parent-educators were surveyed regarding their beliefs about, and use of, internet and search technology. The first phase is not reported upon here (see Morrison, 2020). In the second phase, members of five home-schooling families were observed using a search engine, had their (individual) search proficiency tested and were individually interviewed on their use of and beliefs about online search.

In both studies, video and screen capture footage assisted in the collection of the following quantitative data when participants were searching:

- counts of the query types utilised;
- counts of websites visited per topic;
- time spent on (and practices on) the SERP;
- time spent on relevant versus irrelevant websites (irrelevant sites were those deemed: to contain incorrect or misleading information; to contain unrelated information; unable to answer the item's question);
- percentages of successful versus unsuccessful searches;
- time spent on successful versus unsuccessful searches; and
- scores for self-reported knowledge of search metalanguage.

A scoring system was also developed for the search proficiency test in Study 2 where possible scores were guided by an item's designated level of difficulty. The quantitative data outlined here assist primarily in answering RQ2 regarding search success and any associated new educational benefits.

Participant discourse during the tests (study 1), observations (study 2) and interviews (study 1 and 2) make up the qualitative data for this research and assist in addressing RQ1. Audio recordings during each item were transcribed verbatim. Transcripts were then analysed using a system guided by Fairclough's (2015) three-tiered model for CDA. As established, (see Figure 1) Fairclough identifies any instance of discourse as 'simultaneously a piece of text, an instance of discursive practice and an instance of social practice' (Fairclough, 1993, p 4), requiring three corresponding levels of analysis: the micro, meso and macro. In the first (micro) level of analysis, each text was treated independently, as purely an utterance used to communicate. At the meso level, texts were treated as evidence of broader discursive practice. At the macro level texts were treated as social practices, reflecting wider social ideologies. Put simply, the micro level helps to identify how participants talk about or during search; the meso level helps to identify how they **interpret** what it means to search and to talk about search; and the macro level analysis helps to identify the social conditions making these interpretations privileged in contemporary educational settings.

Research findings

Each study contributed significant new understandings regarding the way Australian students use online search in their education and the ways in which they talk about online search. This article presents just three insights from a wide array of findings. These were chosen based on two considerations: 1) the (search or discursive) practices were prevalent across both studies; and 2) the practices typically appeared to be subconscious. A key focus for CDA is exposing and denaturalising the internalised assumptions that individuals take for granted, and which influence how they interpret discursive and social practices, including for example, online search. This section will first present two insights regarding the students' discursive practices (RQ1) before an insight regarding their search practices (RQ2) is highlighted.

> **Students … clearly lacked understanding (or use) of some standard terminology that could assist them in discussing search.**

Students could develop a stronger 'search' metalanguage

Metalanguage is used here to describe the terminology typically employed when discussing one particular activity or topic. Just as 'low pressure system' and 'forecast' could be said to belong to a *weather* metalanguage, the terms 'query', 'URL' and 'SERP' belong to a search metalanguage. Scores of terms associated with online search now exist, but many are highly technical ('inbound link', 'proximity search', 'term vectors') and their use is not expected of students, nor even of teachers. Notwithstanding, students from both studies (and some parent-educators) clearly lacked understanding (or use) of some standard terminology that could assist them in discussing search.

Upon being asked to describe what a search engine is, one student (from Study 1) explains, 'Just a thing that can give you links to other things'. Another responds, 'What you type in on the internet to find a certain web page'. Students similarly gave overly simplistic descriptions when asked about a search engine's role, responding with comments such as, '… to show the thing you mentioned – that was asked for' and '… to give you some information on how to do stuff'. The discursive practices of the older students from study 2 (those being home-schooled) also revealed a lack of helpful search metalanguage. Phrases like, 'I do the little star because it's quicker', were commonly used by student interviewees when shown footage from their previously-sat search proficiency test. Other examples from study 2 include: 'You said, if you put a little mark on it or the little things … it will make a thing different', and 'I can't remember what I did, but I didn't put the proper punctuation in and it did something else'.

In their introduction to 'Digital Literacies', Lankshear and Knobel (2008) suggest that a 'truly literate individual is able not only to use language but to understand how it works' including the genre's associated codes and conventions. They explain 'in the case of the web, for example, this would include understanding how sites are designed and structured and the rhetorical functions of links between sites' (p 79). Such literacy appeared to be underdeveloped in the student participants from both studies. Of interest was that students appeared aware and honest about this potential shortfall. In both study 1 and study 2 participants ranked their knowledge of a range of search terms from (1) 'no knowledge' to (4) 'good knowledge'. On this item, the older home-schooled students (from study 2) performed better than expected given their observed discursive practices. Out of a possible 76 points, students self-reported knowledge equating to between 39 (51%) and 59 (77%) points. In study 1, however, there was not one term where more than 40% of respondents claimed to have 'good knowledge'.

Students perceive their role as passive when searching

Students from both studies engaged in discursive practices representing searchers as passive and subordinate to the 'all-powerful' search engine. Both during and when discussing search, participant discourse revealed a conceptualised hierarchy where search engines like Google have status above them and any who use them.

This presented in several ways. In their pre-interviews, several students (study 1) explained that they would turn to Google itself, not a teacher, friend or parent, (as in Oliveira and Greenidge, 2020) when troubleshooting problems with online search. Students frequently also expressed a false confidence in the exhaustive nature of a search engine's reach, several suggesting that if the required information is not available on a single search engine, it does not exist or is information 'no one know[s]'. Information that is displayed, by contrast, is accepted uncritically. In study 1, two groups were observed accepting answers they clearly doubted. One boy says. 'I don't know, I'm just gonna go with it', before copying down an incorrect answer. Another notices some profound (later confirmed) errors on a web page, and states, 'Okay. I'm not getting this', but continues to use that page for her answer. In this way, the students trust Google's interpretation of their informational needs, and of the information itself, over even their own.

Of interest is that students appear to recognise, albeit unconsciously, this passive view of searchers. In study 1 student interviewees were asked to choose one of two simplified and stylised images (Figure 2) to represent their interaction with a computer during various scenarios. Both images contain a human, an arrow, and a computer. Drawing A represents the computer directing the interaction and a 'passive' user. Drawing B represents the human directing the interaction, an 'active' user. As previously reported (Morrison and Barton, 2018), when the scenario related to manipulating hardware, for instance installing a printer or adjusting volume, most students chose Drawing B, representing an active user. Similarly, students chose the 'active user' more often than not when describing using Facebook or YouTube to search. However, when the scenario involves online search using Google most students selected the more passive Drawing A. Also there was little 'shift', in the selections made by students, on a similar question post the intervention.

Drawing A: Student as Passive   Drawing B: Student as Active
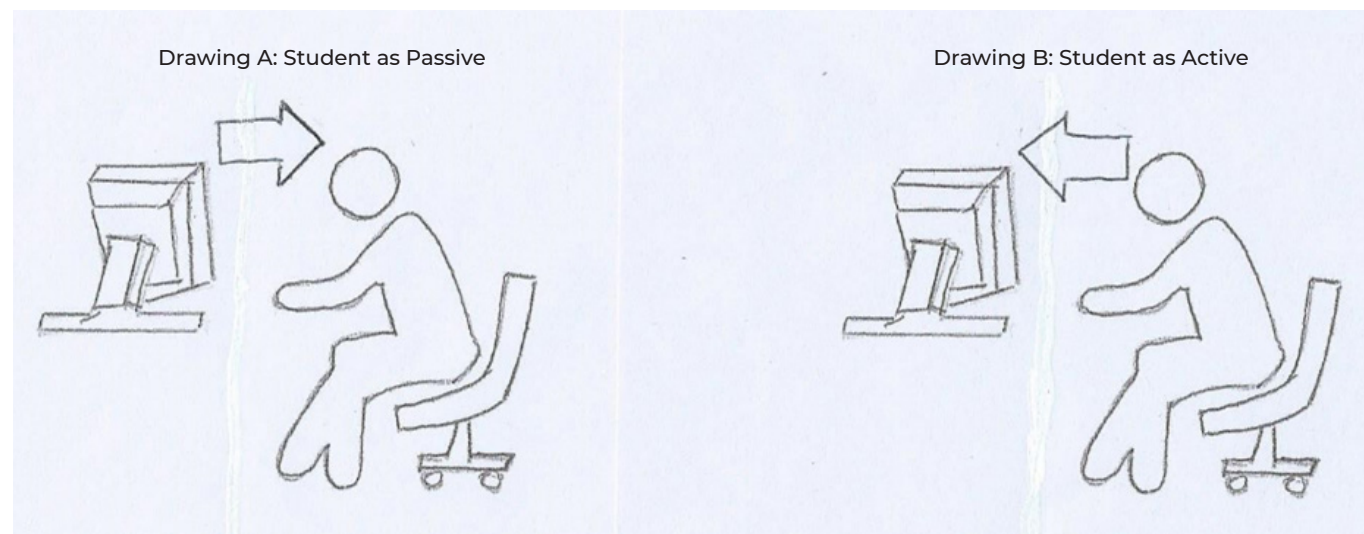
Figure 2

Participant discourse also afforded Google power in other ways. Several discursive practices appeared to absolve the search engine's responsibility for problematic search experiences. When shown footage of their proficiency tests, undesirable responses from Google were commonly justified by students (study 2) with reference to a presumed mistake on their behalf. When the search appeared to perform slowly during one recording (a slowness in fact caused by the screen-capture software) a student explains, 'That could be partly me'. Others immediately presumed that they made a spelling mistake if Google did not return the results sought. That users were responsible for negative search experiences in this way was also apparent in the post-interviews of study 1. Every student made at least one reference to their partner being responsible for certain detrimental search practices. Comments like, 'I think that was Mike', 'Liam told me to', and 'Rhegan talked me into it' were evident in all transcripts, again absolving Google from undesirable and unsuccessful search experiences.

Students search in superficial/ineffectual ways

Students in both studies were found to experience infrequent search success and to use search in ways unlikely to result in new educational benefits. In terms of success overall, of the nine search tasks included in the first study's pre-test, just two were successfully completed by all pairs. Post the intervention, somewhat disconcertingly, only one of the nine different task was successfully completed by all. In the second study, students were observed searching with their parent-educators and individually assessed by a test incorporating an 'on paper' and 'online' component. During the observations, nearly half (42%) of all searches conducted by the home-schooling families were not successfully completed. Regarding the individual proficiency tests, just one of seven items on the paper component attracted full marks by all students while on the online component, no item attracted full marks for all students. If 50% is taken to be a 'pass', moreover, just one student passed the test's paper component and no student passed the online component, despite the tests being piloted for age-appropriateness and level of difficulty prior to distribution.

Potentially more telling are the search practices observed **across** the two studies. Certain limiting practices were found to be common, that is, despite the differing age of student, the differing educational location (school vs home), differences in search instrument (specified tasks vs 'open' search) and irrespective of whether searching alone or with a partner. The studies were also completed several years apart, suggesting perhaps that certain limiting practices have not become 'obsolete' or outdated (as in Ekstrand et al., 2020) despite their inefficiency and despite greater curriculum focus upon 'Digital Technologies' in Australia. In terms of scripting queries, students in both studies:

· tended to use natural language queries in the form of questions;
· failed to use inverted commas to refine their search;
· failed to use inbuilt facilities like genre-specific 'news' tabs or 'advanced search'; and
· infrequently attempted to rescript unsuccessful queries.

Once presented with results on a SERP, students from both studies:

· failed to go past the first results page;
· typically selected the first result displayed on the first page of results; and
· infrequently visited more than one website per topic.

This last point is not innately problematic. Visiting just one website could reflect an efficiency in finding the required information, assuming the information is correct and reliable of course. Unfortunately, other findings question the students' capacity to accurately evaluate websites. In study 1, two of the three groups frequently relied upon blogs or 'knowledge exchange' type websites in addressing their tasks. In the second study too, the home-school students were found to spend more of their test time on irrelevant websites (23%) than on relevant ones (9%).

What does this mean for educators?

Online searching has become one of the most prolific internet activities conducted both in schools (Fraillon et al., 2019; Vanderschantz and Hinze, 2019) and in home-schools (Morrison, 2021) and is reportedly the preferred first 'port of call' for sourcing information in education. This necessitates greater understanding of the skills required to search effectively and of the strategies and environments teachers can use to support students in attaining these skills. This section briefly recaps the insights presented, considers them with regard to existing research and wider social ideologies and presents some recommendations as to their bearing on classroom practice.

RQ1 asked, 'What types of talk (discursive practices) do students engage in during online search and during discussions of online search?' One insight was that students lacked a metalanguage to discuss online searching. This is problematic because online search is similar to any communication where a common language is required (Pikkarainen, 2011, p 1141) and where success is measured by reciprocal understanding (de Oliveira and Baranauskas, 2000; Tosca, 2000). Foss and Druin (2014) suggest the adoption of a metalanguage indicates

familiarity and comfort with digital tasks. Though students here appeared **familiar** with (some of) the search process, the findings of these studies suggest that they should not feel **comfortable** with the results achieved. It appeared that, as reported elsewhere (Combes, 2013; Ladbrook and Probert, 2011; Morrison, 2014; Spengler, 2015; Togia et al., 2014), the students had perhaps not experienced search instruction including the introduction of a search metalanguage. Failing to identify the unique set of terms associated with online search may help endorse the belief that a unique set of skills is not required either. If students are not discursively introduced to search as a complex process, their own discursive (and search) practices are likely to be limited and to reflect the persistent, yet misguided, belief that all searching equates to learning (Rieh et al., 2016). Such absence of instruction is also disadvantageous given that additional time online (even years) does not guarantee better online skills (Sonck, Kuiper, and De Haan, 2012; Van Deursen, Görzig, Van Delzen, Perik, and Stegeman, 2014). Indeed, three decades worth of evidence now confirms that mere access to technology 'does not facilitate new forms of learning' (OECD, 2016, p 39). Student searching is likely to improve when they are introduced to (and expected to use) some basic search terminology, if only because they will be better able to describe difficulties experienced. One can only imagine the success I might experience at the mechanic if I were to describe car trouble stating, 'I can't remember what I did [but] you said if you put a little mark on it or the little things [...] it will make a thing different'. Teachers can support the development of clearer search metalanguage by modelling its use. For instance, by referring to the SERP (search engine results page) when guiding search; to domains such as 'dot gov' or 'dot org'; to 'advanced search', queries and 'search tools'.

> **Teachers can support the development of clearer search metalanguage by modelling its use.**

Also revealed by the students' discursive practices was an assumption that they play a passive role when searching, with Google being ascribed ultimate power. In the intervention in study 1, pre-test and interview findings were shared with students, including this perception of their passive stance, as indicated by Figure 2 choices. To challenge this perception, students were encouraged to think of using Google like driving a car, where the driver's role is critical. Posters placed in the room asked, 'are you driving this search?' Of interest, was that these attitudes and discursive practices proved harder to change than the search practices themselves. All students stressed that their online search had changed since the intervention, and changes were witnessed in the post-tests. Less change was evident regarding this passivity though in the post-interviews. When asked about his searching since the study, one boy explains 'I still let the computer kind of drive itself'. Another post-interviewee states, 'I'm used to Google making the changes to look for me'. This assumption that a digital user's passivity is 'natural' or even 'useful' was previously found by Selwyn et al. (2020) in their study of more than 1100 Australian high school students.

Given that attitudes are more important than resourcing or even teacher skill when it comes to increasing technology-enabled learning (Ertmer and Ottenbreit-Leftwich, 2010), it is imperative that teachers assist students in changing the way they think (and speak) about their role in online search. Such a change may be difficult due to the wider privileging of certain discursive practices (and ideologies) surrounding search.

> **... teachers should ensure that they discursively position their students as active agents driving the search and as being in control of the results revealed.**

Consider the phrase 'Just Google it', for example, which removes searcher agency whilst the term 'just' trivialises this complicated process. Google has a vested interest in and capacity for privileging and naturalising assumptions that anyone can use its products. Consider the phrasing of Google's popular 'I'm feeling lucky' tab. Here too searchers appear discouraged from making extended efforts and are positioned as unskilled, inactive participants (Sun et al., 2014). To begin challenging such assumptions, teachers should ensure that they discursively position their students as active agents driving the search and as being in control of the results revealed. Ask students, 'What did **you tell** Google to search for?' and 'How did **you limit** your query?' Challenge students to try to progressively reduce the (typically millions of) results returned to less than 50, 10 or even one. Then discuss how they did so or struggled to do so foregrounding 'learning to search' not just 'searching to learn'. Huvila (2016) explains, as a society we find it counter-intuitive to critique search engines and their shortcomings. Evidence from the current studies suggest that students need to become more aware of these shortcomings, and of their own, if they are to experience the new educational benefits online search can provide. Teachers too, research tells us, create more effective, constructivist, higher-order search tasks for students once they begin to change their assumptions about 'the internet's potential as a teaching tool' (Hinostroza et al., 2021, p. 251).

Regarding search success (RQ2) findings from these studies add to a body of research suggesting that students today are far from search experts (Argelagós and Pifarré, 2012; Gui and Argentin, 2011; Kammerer and Bohnacker, 2012; Quintana et al., 2012). All students experienced infrequent search success and used search in ways unlikely to result in new educational benefits. Throughout the search process students exhibited limiting practices including when scripting queries. Students, both at home and at school, predominantly used natural language queries in question format (as in Foss and Druin, 2014; Georgas, 2014; Kammerer and Bohnacker, 2012). Scripting queries to a great extent determines search results (Kuiper et al., 2008), so these findings strengthen Bilal and Gwizdka's (2018) suggestion that educators must explicitly teach how to script and **rescript** search queries. Indeed, findings from both Spain (Quintana et al., 2012) and Australia (Morrison and Barton, 2018) reveal that students will change their scripting practices post teacher intervention. When setting students a search task, let them choose the topic as often as possible but define very specific criteria for the search. Require that they find one source or website from Australia (by adding 'site:.au' to the end of queries), one from France and one from China for example. Ask for sources that were published in different decades or ask them to find websites that include conflicting information and to establish their own criteria for evaluating the credibility of each. In his seminal work, Marchionini (2006) also stressed the importance of 'multiple reiterations' and 'cognitive processing' of results if one is to go beyond simple 'look ups' (pp 42-43).

> **... educators must explicitly teach how to script and rescript search queries.**

Once this support has occurred, educators may shift their focus to students' interaction with a SERP. Like elsewhere (Bilal, 2012; Duarte Torres and Weber, 2011), students here were indiscriminate about the sites chosen (although these typically came from the top of the first results page) and infrequently visited more than one website per topic. One of the 'new' benefits of online search is the SERP interface simultaneous displaying multiple site's domain extension identifying the origin of information (with .com representing a commercial site for example and .edu an educational one). That students do not consider this extension (Thomas, 2015) seems possible given their tendency here for choosing blog sites or those ending in the domain '.com'. These search practices not only inhibit students from benefiting in new educational ways, but also disadvantage them in ways unlikely had they utilised the (thoroughly vetted) print resources of old. Students will also benefit from being encouraged to consider multiple websites when searching. Perhaps require that students utilise at least 4 websites and only those sites with a domain extension of '.edu' or '.gov' for example. Beyond the immediate benefits of feeling more confident in the accuracy of information found, the OECD (2015) estimates that searchers who visit just one extra website per task score more highly on the PISA digital reading assessment scale.

Conclusion

True ideological change can take decades. So, while the 'end goal' may be to disrupt naturalised assumptions that technology use is always educational, and that all search equates to learning, in the meantime educators can begin by simply encouraging students to see online search as more complex. Indeed, while it may prove hard for individual teachers to challenge wider (macro) assumptions about search, those promoted by 'just Google it' type discourses (meso), research - including that detailed here - suggests students will change their (micro) search and discursive practices post some teaching intervention. To help ensure these practices result in new educational benefits, it is suggested that educators start: by introducing and encouraging students to use some basic search metalanguage; by inviting students to recognise their active and dominant role in the online search process; and by inspiring students to become more critical users of Google by being aware of its powerful and fundamentally commercial interests.

References and further reading

Argelagós, E., & Pifarré, M. (2012). Improving information problem solving skills in secondary education through embedded instruction. *Computers in Human Behavior, 28*(2), 515-526. http://dx.doi.org/10.1016/j.chb.2011.10.024

Australian Curriculum, Assessment and Reporting Authority (ACARA). (2019). Learning continuum of information and communication technology (ICT) capability.

Beckman, K., Bennett, S., & Lockyer, L. (2014). Understanding students' use and value of technology for learning. *Learning, Media and Technology*, *39*(3), 346-367. https://doi.org/10.1080/17439884.2013.878353

Bilal, D. (2012). Ranking, relevance judgment, and precision of information retrieval on children's queries: Evaluation of Google, Yahoo!, Bing, Yahoo! Kids, and Ask Kids. *Journal of the American Society for Information Science & Technology, 63*(9), 1879–1896. https://doi.org/10.1002/asi.22675

Bilal, D., & Gwizdka, J. (2018). Children's query types and reformulations in Google search. *Information Processing and Management, 54*(6), 1022–1041. https://doi.org/10.1016/j.ipm.2018.06.008

Blikstad-Balas, M., & Hvistendahl, R. (2013). Students' digital strategies and shortcuts. *Nordic Journal of Digital Literacy, 8*(1-2), 32-48.

Bouhnik, D., & Deshen, M. (2014). WhatsApp goes to school: Mobile instant messaging between teachers and students. *Journal of Information Technology Education: Research, 13*(1), 217–231. https://doi.org/10.28945/2051

Casey, A., Layte, R., Lyons, S., & Silles, M. (2012). Home computer use and academic performance of nine-year-olds. *Oxford Review of Education, 38*(5), 617-634.

Castek, J., Coiro, J., Guzniczak, L., & Bradshaw, C. (2012). Examining peer collaboration in online inquiry. *The Educational Forum, 76*(4), 479-496. https://doi.org/10.1080/00131725.2012.707756

Caviglia, F., & Delfino, M. (2016). Foundational skills and dispositions for learning: An experience with information problem solving on the web. *Technology, Pedagogy and Education 25*(4), 487-512. http://dx.doi.org/10.1080/1475939X.2015.1080756

Chevalier, A., Dommes, A., & Marquié, J.-C. (2015). Strategy and accuracy during information search on the web: Effects of age and complexity of the search questions. *Computers in Human Behavior, 53,* 305-315. https://doi.org/10.1016/j.chb.2015.07.017

Cho, J., de Zúñiga, H., Rojas, H., & Shah, D. (2003). Beyond access: The digital divide and Internet uses and gratifications, *IT & Society 1*(4), 46-72.

Claro, M., Salinas, A., Cabello-Hutt, T., San Martín, E., Preiss, D. D., Valenzuela, S., & Jara, I. (2018). Teaching in a Digital Environment (TIDE): Defining and measuring teachers' capacity to develop students' digital information and communication skills. *Computers & Education, 121*, 162–174. https://doi.org/10.1016/j.compedu.2018.03.001

Combes, B. (2013, April). Educating the digital native of the future. *Incite*, 33.

Danby, S., Davidson, C., Theobald, M., Scriven, B., Cobb-Moore, C., Houen, S., Grant, S., Given, L. & Thorpe, K. (2013). Talk in activity during young children's use of digital technologies at home. *Australian Journal of Communication, 40*(2), 83-100.

Davidson, C. (2011). Seeking the green basilisk lizard: Acquiring digital literacy practices in the home. *Journal of Early Childhood Literacy, 12*(1), 24-45. https://doi.org/10.1177/1468798411416788

Davidson, C. (2011b). A young child's Google searching: The affordances of online tools for offline interaction in the home. *Technology and Teaching Practice*.

Davidson, C., Danby, S., Given, L., & Thorpe, K. (2014). Talk about a YouTube video in preschool: The mutual production of shared understanding for learning with digital technology. *Australasian Journal of Early Childhood, 39*(3), 76-83. https://doi.org/10.1177/183693911403900310

Duarte Torres, S., & Weber, I. (2011). What and how children search on the Web. In *Proceedings of the 20th ACM International Conference on Information and Knowledge Management CIKM '11*, 393-402. Glasgow, Scotland, UK. https://doi.org/10.1145/2063576.2063638

Ekstrand, M., Wright, K., & Pera, M. (2020). Enhancing Classroom Instruction With Online News. *Aslib Journal of Information Management, 72*, 5, 725-744. https://doi.org/10.1108/AJIM-11-2019-0309

Ertmer, P., & Ottenbreit-Leftwich, A. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education, 42,* 255–284. https://doi.org/10.1080/15391523.2010.10782551

Eynon, R., & Geniets, A. (2015). The digital skills paradox: How do digitally excluded youth develop skills to use the Internet? *Learning, Media and Technology*, *41*(3), 463-479. https://doi.org/10.1080/17439884.2014.1002845

Fairclough, N. (1993). *Discourse and social change*. Policy Press.

Fairclough, N. (2015). *Language and power* (3rd Ed.), Routledge.

Figueres, C., & Thunberg, G. (2019). Air pollution kills more people than tobacco. *New perspectives quarterly*, *36*(2), 19-21. https://doi.org/10.1111/npqu.12207

Foss, E., & Druin, A. (2014). Children's Internet search: Using roles to understand children's search behavior. Morgan & Claypool Publishers. https://doi.org/10.2200/S00591ED1V01Y201408ICR034

Fraillon, J., Schulz, W., Gebhardt, E., & Ainley, J. (2015). *National Assessment Program – ICT Literacy Years 6 & 10 Report*. Sydney, Australia: Australian Curriculum, Assessment and Reporting Authority.

Fraillon, J., Ainley, J., Schulz, W., Friedman, T., & Duckworth, D. (2019). Preparing for life in a digital world. *IEA International Computer and Information Literacy Study 2018 International Report*. International association for the evaluation of educational achievement (IEA).

Gasser, U., Cortesi, S., Malik, M., & Lee, A. (2012, February 16). Youth and digital media: From credibility to information quality. *Berkman Center Research Publication No. 2012-1*. http://dx.doi.org/10.2139/ssrn.2005272

Gärdén, C., Francke, H., Lundh, A. H., & Limberg, L. (2014). A matter of facts? Linguistic tools in the context of information seeking and use in schools. In Proceedings of ISIC: the information behaviour conference, Leeds, Part 1, *Information Research*.

Gee, J. P. (2004). Discourse analysis: What makes it critical? In R. Rogers (Ed.), *An Introduction to Critical Discourse Analysis in Education* (pp 19-51). Lawrence Erlbaum Associates.

Georgas, H. (2014). Google vs. the library (Part II): Student search patterns and behaviors when using Google and a federated search tool. *Libraries and the Academy, 24*(4), 503-505, John Hopkins University Press.

Green, L., Brady, D., Ólafsson K., Hartley, J., & Lumby, C. (2011). Risks and safety for Australian children on the Internet. *Cultural Science Journal, 4*(1), 1-73.

Green, E. & Holloway, D. (2019). Introduction: Problematising the treatment of children's data. *Media International Australia, 170*(1), 22-26. https://doi.org/10.1177/1329878X19829241

Goldman, S. (2011). Choosing and using multiple information sources: Some new findings and emergent issues. *Learning and Instruction, 21*, 238-242. https://doi.org/10.1016/j.learninstruc.2010.02.006

Gui, M., & Argentin, G. (2011). The digital skill of Internet-natives. The role of ascriptive differences in the possession of different forms of digital literacy in a random sample of Northern Italian high school students. *New Media & Society, 13*(6), 963-980. https://doi.org/10.1177/1461444810389751

Halavais, A. (2013). Search and networked attention. In J. Hartley, J. Burgess, & A. Bruns. (Eds.), *A Companion to New Media Dynamics, 249-261.* https://doi.org/10.1002/9781118321607.ch15

Hashemi, S., & Soltanifar, M. (2011). Analysis of internet literacy among students compared to their trainers and parents in Tehran. *2011 International Conference on Social Science and Humanity IPEDR, 5*, 367-371.

Hillis, K., Petit, M., & Jarrett, K. (2013). *Google and the culture of search.* Routledge.

Internet live stats. (2021).

Kammerer, Y., & Bohnacker, M. (2012, June). Children's web search with Google: The effectiveness of natural lan-guage queries. In *Proceedings of the 11th International Conference on Interaction Design and Children,* ACM, 184-187.

Knight, S., & Mercer, N. (2015). The role of exploratory talk in classroom search engine tasks. *Technology, Pedagogy and Education, 24*(3), 303-319. https://doi.org/10.1080/1475939X.2014.931884

Koole, T. (2015). Classroom interaction. In K. Tracy & T. Sandel (Eds.), *The International Encyclopedia of Language and Social Interaction,* 1-14, John Wiley & Sons.

Ladbrook, J., & Probert, E. (2011). Information skills and critical literacy: Where are our digikids at with online searching and are their teachers helping? *Australasian Journal of Educational Technology, 27*(1), 105-121. https://doi.org/10.14742/ajet.986

Lane, I. (2020, October 1). Australia's NBN should be finished by now, but thousands are still waiting. *The New Daily.*

Lee, Y., & Wu, J. (2013). The indirect effects of online social entertainment and information seeking activities on reading literacy. *Computers and Education, 67*, 168-177. https://doi.org/10.1016/j.compedu.2013.03.001

Lewandowski, D. (2015). Evaluating the retrieval effectiveness of web search engines using a representative query sample. *Journal of the Association for Information Science and Technology, 66*(9), 1763-1775. https://doi.org/10.1002/asi.23304

Literat, I., Kligler-Vilenchik, N., Brough, M., & Blum-Ross, A. (2018). Analyzing youth digital participation: Aims, actors, contexts and intensities. *The Information Society, 34*(4), 261-273. https://doi.org/10.1080/01972243.2018.1463333

Littleton, K., & Mercer, N. (2013). *Interthinking: Putting Talk to Work.* Routledge.

Luke, A. (1995). Text and discourse in education: An introduction to critical discourse analysis. *Review of Research in Education, 21,* 3-48. https://doi.org/10.3102/0091732X021001003

Maher, D. (2012). Teaching literacy in primary schools using an interactive whole-class technology: Facilitating student-to-student whole-class dialogic interactions. *Technology, Pedagogy and Education, 21*(1), 137–152. https://doi.org/10.1080/1475939X.2012.659888

Major, L., Warwick, P., Rasmussen, I., Ludwigsen, S., & Cook, V. (2018). Classroom dialogue and digital technologies: A scoping review. *Education and Information Technologies, 23*(5): 1995–2028. https://doi.org/10.1007/s10639-018-9701-y

Marchionni, G. (2006). Exploratory search: from finding to understanding. *Communications of the ACM, 49*(4), 41-46.

Mercer, N., Warwick, P., Kershner, R., & Staarman, J. (2010). Can the interactive whiteboard help to provide 'dialogic space' for children's collaborative activity? *Language and Education, 24*(5), 367-384. https://doi.org/10.1007/s11412-010-9096-2

Morrison, R. (2014). *Surfing blind: A study into the effects of exposing young adolescents to explicit search engine skills* (Unpublished master's thesis). Griffith University, Queensland, Australia.

Morrison, R. (2020). *Search engine use in Australian home-schools: An exploration framed by the generational digital divide construct.* (Unpublished Doctoral thesis). Griffith University, Queensland, Australia.

Morrison, R. (2021). Internet use in home-education: Enablers and barriers. In R. English (Ed.), *Global perspectives on home education in the 21st century*, 200-228, IGI Global.

Morrison, R., & Barton, G. (2018). Search engine use as a literacy in the middle years: The need for explicit instruction and active learners. *Literacy Learning: The Middle Years, 26*(3), 37-47.

Nicholas, D., Rowlands, I., Clark, D., & Williams, P. (2011). Google generation II: Web behaviour experiments with the BBC. *Aslib Proceedings, 63*(1), 28–45. https://doi.org/10.1108/00012531111103768

Nygård, T., Hirvonen, N., Räisänen, S., & Korkeamäki, R. (2020). Ask your mother! Teachers' informational authority roles in information-seeking and evaluation tasks in health education lessons. *Scandinavian Journal of Educational Research.* https://doi.org/10.1080/00313831.2020.1788145

Oliveira, S., & Greenidge, N. (2020) Information seeking behavior of distance learners: What has changed in twenty years? *Journal of Library & Information Services in Distance Learning, 14*(1), 2-27. https://doi.org/10.1080/1533290X.2020.1791301

OECD. (2010). *PISA 2009 Framework: Key Competencies in Reading, Mathematics and Science..* OECD Publishing. https://doi.org/10.1787/9789264062658-en

OECD (2015), *Students, computers and learning: Making the connection*, PISA, OECD Publishing. https://doi.org/10.1787/9789264239555-en.

Plowman, L., McPake, J., & Stephen, C. (2008). Just picking it up? Young children learning with technology at home. *Cambridge Journal of Education, 38*(3), 303–319. https://doi.org/10.1080/03057640802287564

Quintana, M., Pujol, M., & Romani, J. (2012). Internet navigation and information search strategies: how do children are (sic) influenced by their participation in an intensive ICT project. *International Journal of Technology and Design Education, 22*(4), 513-529. https://doi.org/10.1007/s10798-011-9158-4

Rieh, S., Collins-Thompson, K., Hansen, P., & Lee, H-J. (2016). Toward searching as a learning process: A review of current perspectives and future directions. *Journal of Information Science, 42*(1), 19-34. https://doi.org/10.1177/0165551515615841

Rogers, R. (Ed) (2004). *An introduction to critical discourse analysis in education.* Lawrence Erlbaum Associates Inc.

Rogers, R., Malancharuvil-Berkes, E., Mosley, M., Hui, D., & O'Garro Joseph, G. (2005). Critical discourse analysis in education: A review of the literature. *Review of Educational Research, 75*(3), 365-416. https://doi.org/10.3102/00346543075003365

Roy Morgan Research. (2017). Kids now spend more time online than watching TV.

Schroeder, R. (2014). Does Google shape what we know? *Prometheus, 32*(2), 145-160. https://doi.org/10.1080/08109028.2014.984469

Schultheiß, S., & Lewandowski, D. (2021). How users' knowledge of advertisements influences their viewing and selection behavior in search engines. *Journal of the Association for Information Science and Technology, 72*, 285-301. https://doi.org/10.1002/asi.24410

Selwyn, R., Bulfin, S., & Johnson, N. (2020). The 'obvious' stuff: Exploring the mundane realities of students' digital technology use in school. *Digital Education Review, 37.* https://doi.org/10.1344/der.2020.37.1-14

Selwyn N. (2010). Looking beyond learning: Notes towards the critical study of educational technology. *Journal of Computer Assisted Learning, 26,* 65–73. https://doi.org/10.1111/j.1365-2729.2009.00338.x

Spengler, S. (2015). *Educators' perceptions of a 21st century digital literacy framework.* Unpublished doctoral dissertation, Walden University, Minnesota.

Theobald, M., Danby, S., Davidson, C., Houen, S., Scriven, B., & Thorpe, K. (2016). How talk and interaction unfold in a digitally enabled preschool classroom. *Australian Journal of Linguistics, 36*(2), 189-204. https://doi.org/10.1080/07268602.2015.1121530

Thomas, J. (2015). Resource students' use of internet inquiry strategies in an online inquiry project. *Exploring Pedagogies for Diverse Learners Online Advances in Research on Teaching, 25,* 25-65. https://doi.org/10.1108/S1479-368720150000027021

Togia, A., Korobili, S., Malliari, A., & Nitso, I. (2014). Teachers' views of information literacy practices in secondary education: A qualitative study in the Greek educational setting. *Journal of Librarianship and Information Science,* 1-16. https://doi.org/10.1177/0961000614532485

Vanderschantz, N., & Hinze, A. (2019, October). 'Computer what's your favourite colour?' Children's information seeking strategies in the classroom. Proceedings of the *Association for Information Science & Technology*, *56*(1), 265–275. https://doi.org/10.1002/pra2.21

Van Dijk, J. (2012). The evolution of the digital divide – the digital divide turns to inequality of skills and usage. In J. Bus, M. Crompton, M. Hildebrandt, & G. Metakides. (Eds.). *Digital Enlightenment Yearbook 2012,* 57-75, IOS Press.

Weber, H., Becker, D., & Hillmert, S. (2019). Information-seeking behaviour and academic success in higher education: Which search strategies matter for grade differences among university students and how does this relevance differ by field of study? *Higher Education: The International Journal of Higher Education Research*, *77*(4), 657-678. https://doi.org/10.1007/s10734-018-0296-4

Wegerif, R., & Major, L. (2019). Buber, educational technology, and the expansion of dialogic space. *AI & Society, 34,* 109-119. https://doi.org/10.1007/s00146-018-0828-6

Wilson, E. O. (1999). Back from chaos. *The Atlantic Monthly.*

Wodak, R. (1999). Critical Discourse Analysis at the End of the 20th Century. *Research on Language & Social Interaction, 32*(1-2), 185-193. https://doi.org/10.1080/08351813.1999.9683622

You, K. H., Lee, S. A., Lee, J. K., & Kang, H. (2012). Why read online news? The structural relationships among motivations, behaviors, and consumption in South Korea. *Information, Communication & Society.* https://doi.org/10.1080/1369118X.2012.724435

Zillien, N. & Hargittai, E. (2009). Digital distinction: Status-specific internet uses. *Social Science Quarterly, 90*(2), 274-291. https://doi.org/10.1111/j.1540-6237.2009.00617.x

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Writer biographies

Emeritus Laureate Professor John Hattie

Through his role as AITSL's Board Chair, Emeritus Laureate Professor John Hattie provides national leadership in promoting excellence, so teachers and school leaders have maximum impact on learning. John's influential 2008 book 'Visible Learning: A synthesis of over 800 meta-analyses relating achievement' is believed to be the world's largest evidence-based study into the factors that improve student learning. Other notable publications include, 'Visible Learning for Teachers', 'Visible Learning and the Science of How We Learn', 'Visible Learning for Mathematics, Grades K-12', and '10 Mindframes for Visible Learning'.

James Hoffman

James Hoffman leads the Primary Curriculum team in Educational Standards with the NSW Department of Education. He is an experienced educational leader with a demonstrated history of success in public education. Passionate about empowering primary teachers, James draws on rich curriculum leadership experience to provide high quality, trusted expertise to improve teaching and learning for every student, teacher and leader.

Cheryl Bullow

Cheryl Bullow is an educator, an editor and a publisher of quality reading material for young people. After a decade of teaching, she took up a position as an educational publisher, publishing a number of high-quality reading programs. For the last ten years, Cheryl has worked at The School Magazine – producing rich and colourful magazines for young readers. She continues to believe that she has the most rewarding job in the world.

Dr Renee Morrison

Dr Renee Morrison is a lecturer in primary curriculum at the University of Tasmania. She taught in high schools for 14 years both in Australia and internationally. Renee's research focuses on technology and the capacity to assist educators and students reach their potential in the 21st century.