

From I-Search to iSearch 2.0

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ABSTRACT: This classroom narrative proposes a process for reinventing academic research and writing in secondary schools for the 21st Century. We build on Macrorie's (1988) I-Search paper, drawing on affordances of Web 2.0 technologies and culture, to initiate the iSearch 2.0 process. iSearch 2.0 consists of four phases: 1) messing about and trying on questions; 2) exploring and expanding the edge of knowledge; 3) publication; and 4) reflection and self-assessment. This new academic research and writing process makes it possible for students to investigate and try out possible research topics, actively participate in the social construction of knowledge, trace sources efficiently, create meaningful products, and distribute information (regarding both the process and products of research) widely. iSearch 2.0 allows students to receive feedback from broad publics during the process of research and also to utilise multiple methods and compositional modes for self-reflection. Assessment strategies for iSearch 2.0 can incorporate interest communities outside the school and should consider the process and products of inquiry.

KEYWORDS: Assessment, collective intelligence, I-Search, iSearch 2.0, inquiry, "messing about", publishing out, academic research and writing, Web 2.0 technologies and culture, youth.

More than thirty years ago, Macrorie (1988) denounced the school-assigned research paper as "an exercise in badly done bibliography, often an introduction to the art of plagiarism, and a triumph of meaninglessness – for both writer and reader" (p. v). Many of us who have taught or written a research paper can attest that Macrorie's assessment is too often true. As an alternative, Macrorie developed an inquiry-based approach to research and writing called the I-Search Paper. Many high school and college teachers have followed Macrorie's lead and invited their students to take up topics of interest, research them via primary and secondary sources, and write narrative accounts of their learning processes. There have even been efforts along the way to update the I-Search process (for example, Davis, 1995; Education Development Center, 2000; Klausman, 2007; Luther, 2006; Lyman, 2006.), but none of these efforts goes far enough in fully imagining I-Search for the 21st Century.

Here, we propose a reconceptualisation of the I-Search paper that allows students to take advantage of the possibilities for inquiry, publishing and connectivity afforded by Web 2.0 technologies and culture. As an explanation for what is meant by Web 2.0, we refer readers to Internet innovator O'Reilly's (2005) landmark article describing the term. In our work, we began with O'Reilly's definition and tailored it to focus specifically on the following elements of Web 2.0: 1) the possibility for participating in media construction, distribution and critique; 2) the possibility for remixing online content to create new messages for new purposes; and 3) the possibility for "harnessing collective intelligence" through socially constructing knowledge and participating in online communities.

We call our reconceptualisation iSearch 2.0. It was developed over the course of a year that we spent reading and thinking about new media and learning. Although we have not had the opportunity to explore this reconceptualisation extensively in classrooms, it is based on our extensive experience as classroom teachers and education researchers and supported by our experiences with middle- and high-school students and by publicly available examples of students engaging in practices that fit within, if not fully encompass, iSearch 2.0. This piece is intended as an invitation to participate in a process of reinventing research and writing for the 21st Century. We recognise that not all schools have the technological infrastructure to put into practice our iSearch 2.0 process. However, because we see this article as an opening to the conversation about how we might rethink research and writing for the 21st Century, we do not focus on adapting the process for all classrooms. Excellent resources are available on Web 2.0 possibilities in schools with limited technology resources (for example, Davies & Merchant, 2009; Herrington, Hodgson & Moran, 2009; Kist, 2010).

Macrorie (1988) envisioned an academic research process in which students come to know "ways of building and forming their opinions and knowledge, of building upon their own experience, which can make them authorities as well" (p. ii). But Macrorie's vision for empowering students through the I-Search process could not have accounted for the methods students now have for becoming authorities and sharing knowledge with the world. Participatory culture and the power of collective intelligence as described in Jenkins (2008), and afforded by Web 2.0 technologies, make possible an expansion of Macrorie's (1988) vision: in iSearch 2.0, students build and form knowledge within and across participatory frameworks online and offline, becoming recognised authorities who share knowledge broadly, and, in many cases, act on this knowledge.

In this article, we introduce four phases of the iSearch 2.0 process: 1) messing about and trying on questions, 2) exploring and expanding the edge of knowledge, 3) publication, and 4) reflection and self-assessment. We also consider teacher assessment of projects developed using iSearch 2.0. By structuring iSearch 2.0 here as a series of phases, we do not intend to imply that the process is linear, that students will move cleanly from one phase to the next. As with any writing, this process is recursive and messy. However, our phases should imply significant shifts from the key elements of Macrorie's I-Search. See Table 1 for an outline of key shifts from I-Search to iSearch 2.0. These shifts, which we address specifically throughout the article, have been central to our thinking about the possibilities of iSearch 2.0 in the classroom.

I-Search	iSearch 2.0
Topic finding	Messing about
Blend of known and unknown	Edge of knowledge
Personal stance	Social negotiation of knowledge
Narrative	Multiple distributions
Source documentation for publication	Source tracing
Classroom as audience	Publishing out

Table 1. Shifts from I-Search to iSearch 2.0

PHASE 1: MESSING ABOUT AND TRYING ON QUESTIONS

In many classrooms, students select research topics from a list provided by the teacher, or if given a choice, they are usually required to generate a research topic or question without sufficient time for reflection or formulation. This process of topic selection means that students rarely access prior knowledge or experiences before starting their inquiry, which can lead to superficial questions that students will likely abandon when encountering difficulty in their searches. Macrorie (1988) hoped to change this process of topic selection and included a chapter in *The I-Search Paper* titled “A Topic Choosing You”. In iSearch 2.0, the process of topic selection expands on Macrorie’s vision and makes way for students to let topics emerge, a mutual choosing that is possible when students have the freedom and time to try out multiple topics of interest.

Unlike the typical in-school inquiry process, students on their own are inclined to inquire online in a dynamic manner. They are more challenged, engaged and successful when they are allowed to generate their own question, instead of being constrained by a tightly focused assignment (Kuiper, Volman & Terwel, 2005). Instead of the linear school-based process of picking a topic before inquiry, locating the authoritative sources on that topic, and filling in their knowledge gaps, students are more likely to inquire online through a process described by Ito and colleagues (2010) in their landmark study of youth online as “messing about”, which involves tinkering, exploring and extending their understanding of a topic.

During exploration, young people are drawn to self-directed, peer-based and interest-driven learning, where the opportunity to socialise and enter “affinity groups” is a key motivation for learning (Gee, 2000). Messing about involves experimentation with relatively low investment, where there are few consequences for trial, error and even failure. Young people can “lurk” and observe different spaces such as web forums and chat rooms in order to gauge their interests. This can lead to “geeking out” and gaining deeper knowledge through interaction with participation communities where students learn from others while also sharing their knowledge and skills (Ito et al., 2010).

The iSearch 2.0 framework of searching for a question complements the ways young people are inclined to inquire online. It begins with a question instead of a topic, a key delineation Macrorie (1988) originally made with the I-Search paper. Students are encouraged to pursue questions they are genuinely interested in and want to learn

more about. These questions might stem from out-of-school interests and skills (for example, how would I create a podcast for my surfing blog?) or a need they see in their community or personal life (for example, what are ways that I can decrease my carbon footprint?). While looking for a question to pursue, most students will try on different questions, mess about in a particular field, and then possibly discard a question and move to a new question until they find one that is interesting on various levels (for example, intellectually, socially and personally).

As an example, one of us taught a high-school senior, April (a pseudonym), who was interested in becoming a veterinarian. At the time, April was an intern at a local veterinarians' office. As she began her inquiry process, a high profile rodeo was about to take place in a nearby city, and April saw news coverage of people protesting the treatment of the rodeo animals. Although she was initially interested in the work of large animal doctors, she began to explore issues around the ethical treatment of animals. She checked out various websites, followed links, learned more from the veterinarians she interned with, had discussions with friends who owned farm animals, and read pamphlets produced by a group opposing the rodeo.

This wandering, both online and offline, might appear extraneous and time-consuming, but it helped April find her question. From messing about, April was able to formulate an informed, personally interesting and relevant question: "Are rodeo animals and other animals involved in entertainment treated ethically?" April's investigation led her to consider how she might effect change in the treatment of these animals. She refined her question to "How can I change the way animals involved in entertainment are treated?" This process of letting the question and student find each other takes time and freedom, but it allows for more authentic and focused inquiry.

The iSearch 2.0 question is formed with the intent of some ultimate contribution, and considering this contribution is an important part of generating a question. Since the goal is to publish out to broad audiences, it is important that students find questions that allow them to share what they have learned with others. This contribution can take many forms, including sharing one's knowledge within an online community, creating something or organising action. For example, at the conclusion of her inquiry project, April could have joined a new social community – animal rights activists – and actively participated in their efforts. However, the contribution does not have to take the shape of civic engagement. April could, instead, decide to make a video highlighting the treatment of rodeo animals to share what she learned with her classmates, which is what she did in this case. What is important here is that students like April consider their ultimate contributions while generating questions.

As students like April mess about and allow questions to emerge, they begin to research and participate in ways that are central to the iSearch 2.0 process. After identifying personally relevant questions, students continue the process of researching the question and participating in knowledge communities.

PHASE 2: EXPLORING AND EXPANDING THE EDGE OF KNOWLEDGE

After students come to a question, their inquiry process transitions into something like geeking out (Ito et al., 2010), a more focused effort to participate and create

knowledge within and across affinity groups. During this second phase of iSearch 2.0, three processes are important: first, social negotiation of knowledge; second, tracing sources; and third, evaluating sources.

Students seeking answers to their questions are not thinking about writing a report for the teacher as the end goal of the research process. Instead, they are focused on moving from being a novice to an expert in a particular field, not only through information gathering, but also through an emerging role in an active community. For example, a student who wants to learn how to cook might join an online community devoted to creating recipes that use local ingredients. Information is shared among the members of the community, and together they expand their collective knowledge and better the community.

iSearch 2.0 anticipates that students will need a systematic process for tracing sources throughout the inquiry process. Just as Macrorie (1988) recognised that the traditional research paper, as many of us have taught it, is meant to be systematic and thorough in its process of documentation, the reality is usually far from this ideal: “Those of you who’ve seen or done a research paper in school are probably laughing. More than half of such papers are done carelessly, unsystematically, impatiently” (p. 161). But for students engaged in iSearch 2.0, keeping track of sources consulted, strategies used, conjectures made, and questions posed and answered is necessary.

Students who are tracing sources have many options for documenting the process, the sources consulted, and the knowledge communities affiliated with their topic. They can write a personal blog or keep a journal in a word processing document with daily entries about their work. Some students might choose to document their online research path by using diigo.com, which traces a student’s Web search history and allows her or him to make sticky notes for each site visited.

Instead of asking questions with known answers (that is, those that might be found in an encyclopedia), students work at the edge of knowledge, asking questions that are currently relevant and that will help construct new knowledge. Internet searches can be key starting points for locating information, online knowledge communities, and print and multimedia materials related to students’ questions. However, students will need help evaluating the sources they encounter on the web. One way teachers can facilitate effective web search strategies is to hold weekly “web savvy” workshops, where students share strategies and web evaluation criteria to help one another find useful and credible information. The classroom community is an important part of the iSearch 2.0 process. Students share their projects-in-process, and classmates can help them think about how to evaluate sources, combine information, and identify other potential sources of knowledge. Students may also use their classmates as a “practice audience” for presentations and publication of their ideas.

PHASE 3: PUBLICATION – A MOVE TOWARD PARTICIPATORY CONSTRUCTION OF MEDIA

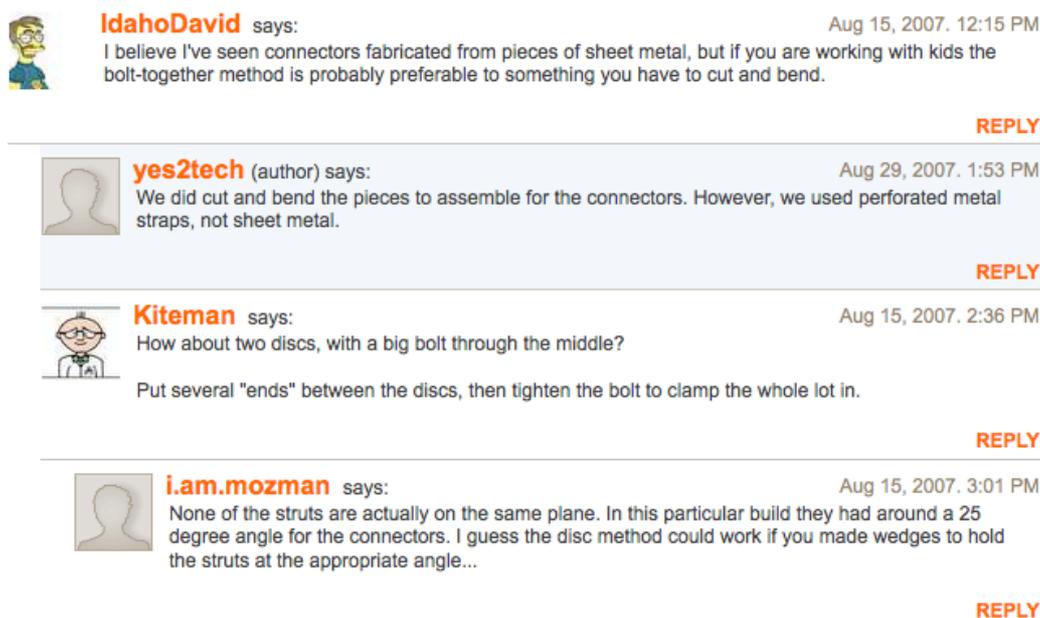
The iSearch 2.0 process opens up a range of possibilities for final products. Along with new methods of inquiry afforded by the iSearch 2.0 process come new ways of thinking about publication and distribution of information and ideas. Historically,

academic writing has separated the moment of production from the moment of publication, which happens much later. Additionally, academic writing has separated private from public spaces, as the writing takes place in private and becomes public only through publication once the piece is complete. Composition and publication in the iSearch 2.0 framework begin to blur these boundaries between the moments of production and publication, and between private and public spaces.

Publishing in iSearch 2.0 pushes students to write for a different audience than that of a traditional research paper. When students complete school-assigned writing products, they often write for the narrow audience of the teacher. This type of publication exemplifies an expert paradigm, which we think of as *publishing up* (to the teacher or expert): the student writes a paper for the teacher who is more of an expert in this field, and the expert determines whether or not the student possesses enough knowledge. The iSearch 2.0 pushes instead toward *publishing out* for participatory social groups to share one's own knowledge and to learn from others in the group. In this paradigm, publications are disseminated out to an audience of interested group members, not just to a single expert. Knowledge is open-ended, dynamic and built through collective engagement. In this kind of publication, learning does not end when a student prints a paper and submits it to the teacher; rather, learning continues through ongoing participation in knowledge communities and engagement with others.

This participatory version of learning is evident in an example from the "Instructables" website (YES-2-Tech, 2007), where a group of youth posted instructions for building a greenhouse. These youth are involved in the Youth Exploring Science (YES) program at the St. Louis Science Centre, a community organisation that teaches math, science, technology and life skills to community youth. The group from YES published their initial questions and answers about greenhouses (for example, "Why is it so hot inside?"), their suggestions about when to plant, and a 31-step sequence of instructions, with pictures.

From the time the greenhouse instructions were published online in August 2007 through October 2011, 84 outsiders posted comments. While some of the comments are merely congratulatory, the majority are discussions and considerations of building processes and alternatives. Consider, for example, the following exchange (Figure 1), in which various options of connectors are considered, and one project participant joins in to explain their process. Important in this exchange is not just that the group is publicly recognised, but that their work has become part of a knowledge-sharing community – it has taken on a life of its own. What holds collective intelligence of this kind together "is not the possession of knowledge, which is relatively static, but the social process of acquiring knowledge, which is dynamic and participatory" (Jenkins, 2008, p. 54). In the shift from publishing up toward publishing out, one's status and identity as a knowledgeable community member undergoes transformation.



The screenshot shows a forum thread with four posts. The first post is by IdahoDavid, dated Aug 15, 2007, 12:15 PM, discussing connectors made from sheet metal. The second post is by yes2tech (author), dated Aug 29, 2007, 1:53 PM, stating they used perforated metal straps. The third post is by Kiteman, dated Aug 15, 2007, 2:36 PM, suggesting two discs with a bolt through the middle. The fourth post is by i.am.mozman, dated Aug 15, 2007, 3:01 PM, explaining that struts are on different planes and suggesting wedges. Each post has a 'REPLY' link.

IdahoDavid says: Aug 15, 2007. 12:15 PM
I believe I've seen connectors fabricated from pieces of sheet metal, but if you are working with kids the bolt-together method is probably preferable to something you have to cut and bend.

yes2tech (author) says: Aug 29, 2007. 1:53 PM
We did cut and bend the pieces to assemble for the connectors. However, we used perforated metal straps, not sheet metal.

Kiteman says: Aug 15, 2007. 2:36 PM
How about two discs, with a big bolt through the middle?
Put several "ends" between the discs, then tighten the bolt to clamp the whole lot in.

i.am.mozman says: Aug 15, 2007. 3:01 PM
None of the struts are actually on the same plane. In this particular build they had around a 25 degree angle for the connectors. I guess the disc method could work if you made wedges to hold the struts at the appropriate angle...

Figure 1. An example of an active online knowledge sharing community. The conversation was initiated by a youth organisation posting a set of instructions for building a greenhouse.

The opportunity for social and/or critical identification is another key element of iSearch 2.0 publication. Young people often assume a socially critical stance in which they have a personal stake, as opposed to the impersonal stance we often see in students' more traditional research reports. Rather than the usual measures of authority, the degree of social engagement becomes a measure of authority – how active a participant is in the community gives that person status within the community. Students' identities and their identification of information and resources become part of the story, so that publishing in iSearch 2.0 involves two levels of communication: first, the story about the journey of finding a question and gathering information (the *process* of inquiry), and second, the *product* generated for dissemination to audiences.

Additionally, through and within their choices of media outlets, students have increased opportunities for personalisation and aestheticisation of their products. Websites, blogs, YouTube videos and other forms of media production are highly aesthetic; youth spend hours of detailed work getting web pages just right or decorating virtual rooms in online communities (Leander & Frank, 2006). Even highly routine forms of production such as instant messaging or posting to Facebook profiles are often saturated with the voices, identities and careful aesthetic crafting of writers, and would be entirely misread if we considered them as merely informational texts (Lewis & Fabos, 2005). School writing and research, by contrast, often considers aesthetic personalisation as mere décor and not intrinsic to the production process itself, despite its being tied up in students' identities, social relationships and social capital (Leander & Frank, 2006). The iSearch 2.0 process allows for students to integrate these aesthetic practices with academic work.

PHASE 4: REFLECTION AND SELF-ASSESSMENT

One of the strengths of the original I-Search approach is the emphasis on students' research journeys and their development as curious and strategic inquirers. The journey, and the understanding of that journey in relation to personal interests, inquiry processes and learning, is just as important as the final product(s). I-Search guidelines ask students to reflect throughout the process and to evaluate their experience in the last section of the report, "What I Learned" (Macrorie, 1988).

Web 2.0 opens new possibilities for self-reflection and obtaining feedback from circles of responders, that range from the physically present (classmates, teachers, family) to the geographically dispersed (various online communities and contacts). For example, students can post periodic reports on "how I'm doing" to a blog or Ning that is restricted to the school, friends and family community – a first tier of responders. The purpose of these kinds of posts would be for students to develop awareness of their own learning processes, preferences, stumbling blocks and strategies for moving forward. It would also be a place to get help and to learn from comments and other students' posts. Another option would be for students to periodically tweet (using Twitter), while making breakthroughs in the process and/or encountering problems. A second tier of responders could be found in the online communities that students affiliate with and in the response to their online publication and participation. The extent to which students' contributions (for example, blog postings, comments to others' web content, responses to listservs, and so on) generate uptake from the online community is a new form of formative assessment. The comments posted in response to student postings, blog traffic data and Twitter followers are all means of providing feedback that may help shape the inquiry or product, while developing students' awareness of how they are constructing their researcher identities on the Internet.

Opening up the reflection process to include different modes of representation can be quite appealing to students and push them to think more abstractly about who they are as researchers and contributors to the larger community. For example, students could create a multimedia PowerPoint or digital story to represent their iSearch 2.0 journey, choosing an image, a sound or recording, and written text to communicate something important about their learning and achievement in each phase of the process. Alternatively, students could develop the equivalent of the "Director's Cut" that accompanies most movie DVDs to communicate their progress, or craft a photo essay with audio or written commentary explaining their evolution as a researcher and member of an online community. While the videos could be posted to their blogs, they could also be shared on YouTube, publishing out via multiple distribution channels.

ASSESSMENT IN ISEARCH 2.0

The teacher does not have to be the sole participant in assessment; other students and members of interest communities may also assess students' work and provide feedback on process and products. In addition, it would be useful to develop initial assessment criteria with students and to let the criteria evolve as students develop

expertise in the world of iSearch 2.0 and generate examples to illustrate various aspects of the learning process. Because the process of inquiry is such a key part of iSearch 2.0, it is important that assessment consider this journey, in addition to product(s) and contributions. Evaluation criteria could address, for example, process, product, participation in the online community, contributions, multimedia design and communicative effectiveness. Rubrics for assessment might address each of the above-mentioned criteria, or separate rubrics might be developed for the different elements of the iSearch process. For example, the Education Development Centre's (2000) "Make It Happen!" I-Search unit suggests separate rubrics for elements, including, "my search process," "what I learned", "what this means to me", and "growth as a researcher". The primary considerations for assessment in iSearch 2.0 are that students should be involved in the assessment process and that assessment criteria should consider both the process and products of inquiry (see also Herrington, et al., 2009; Kist, 2010).

CORE COMPETENCIES OF ISEARCH 2.0

In addition to the core competencies of reading, writing and inquiry that the traditional research paper and the I-Search paper developed, iSearch 2.0 also incorporates new competencies of Web 2.0 technology. Students learn to negotiate the architecture of participation through messing about and becoming both producers and consumers in knowledge communities. They learn to harness collective intelligences and to negotiate their own roles in contributing to the collective. They learn to develop evaluative stances toward information and sources. Finally, students learn to work with various media and to produce and comprehend multimodal texts.

We were inspired by Macrorie's vision for a research process that could be student-centred and meaningful. With rapidly increasing technological and cultural changes that allow for increased participation in all aspects of civic life, we felt it was time to fully re-imagine the I-Search for the 21st Century. And we believe that if students are given opportunities to participate in knowledge communities and in the social construction of currently relevant information and ideas, as they are through the iSearch 2.0 process, they will be better prepared to fully participate in and contribute to society.

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