Innovations in Interdisciplinary Learning: Electronic Resources for Learning and Research

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Introduction

Interdisciplinary learning and research is a growing area for government investment[1,2] and many institutions are following suit by reorganizing departments and establishing interdisciplinary research centers.[3] What is clear to many in the higher education community is that, in order to develop and support interdisciplinary research, new infrastructure and resources are needed to help emerging scholars thrive in this new landscape.

Today I will share how ProQuest, is supporting interdisciplinary learning and research, and how we envision fostering interdisciplinary research growth. To help orient you, it is useful to think of ProQuest as a large information aggregator. We collect and render for our users vast amounts of information, from today's New York Times front-page articles, to digitized editions and audio plays of William Shakespeare, and from groundbreaking research published in the New England Journal of Medicine, to a PhD dissertation in Anthropology from the University of New South Wales. We bring this information together into a common but customizable online platform that delivers improved research experiences to our user base in universities around the world. We are part of a market of information aggregators, such as JSTOR, and public resources such as PubMed Central.

Supporting Interdisciplinary Research and Learning

We believe the following are necessary in developing electronic resources for interdisciplinary research and learning:

- Breadth of information: Interdisciplinary research, by definition, spans different subject disciplines and different content domains. As such we believe that electronic resources that support interdisciplinary research must draw content from across the disciplines being supported. In supporting interdisciplinary research, we draw from sources spanning science, medicine, humanities, business, political sciences, social sciences, arts and literature— delivering information to researchers from fields adjacent to their areas of expertise and bridging gaps between traditionally disparate disciplines of study.

- Source of information: Interdisciplinary research may need to draw from a range of content sources, reflecting where valuable information resides in different domains. In some areas such as life sciences, scholarly journals can be a primary source for information exchange. However, information consumption can vary by discipline: economics researchers may use

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[1] Basken, P. "National Science Foundation Steps Up Its Push for Interdisciplinary Research," *The Chronicle of Higher Education*, Feb 13, 2012.

[2] Petrie, M., "NIH Seeks to Foster Interdisciplinary Research," *The Chronicle of Higher Education*, Sep 21, 2007.

[3] Jacobs, J., "Why the Disciplines Still Matter," *The Chronicle of Higher Education*, May 27, 2014.

conference proceedings more regularly, physicists often rely on preprints, and humanities disciplines typically utilize monographs in greater proportion than sciences.[4] Primary sources such as government documents, historical news, and data, can be essential to certain disciplines. At ProQuest we seek relevant, trusted content that has been vetted through review processes, while at the same time being agnostic to content type (e.g. journal, book, dissertation, news).

- Removed silos. As an information provider, we are often oriented to manage our information sources by discipline specialty, which can limit interdisciplinary research. Increasingly, we are challenging ourselves to open large content swaths for research. We see ourselves and other providers increasingly offering access to their entire collections and developing new access models, such as Demand Driven Acquisition, a popular model from E-Book publishers.

- Delivered Insights: The dawn of "Big Data," and the computational and analytical tools that can mine content in text or data format, have proved a catalyst for interdisciplinary research in unlocking hidden information and developing new knowledge. For example, ProQuest recently supported a team of historians, information and computer scientists spanning five organizations to identify historical trade routes by mining over 10 million historical document pages. The research identified plausible historical trade routes, with citations back to the historic content for further validation.[5] This is one example of how computational power can foster interdisciplinary research insights. E-resource providers must determine what their role will be in delivering such insights. It can extend from content provision, through open platforms that support text and data mining, to software and analytics, to solutions that will improve researchers' outcomes.

Future Directions
Looking to the future, we see several areas in which further development by e-resource providers will accelerate interdisciplinary studies:

1. Fostering collaboration: To facilitate and accelerate research and learning in disparate departments and environments, and to create workflow tools that need to be embedded at the point of information use. For example, for e-resource providers, greater inclusion of reference management tools and document sharing with peers, alongside the utilization of information, could foster information exchange and collaboration.

2. Creating serendipity. Information providers have the potential to inject interdisciplinary opportunities into research workflows. Recommendation engines have the potential to identify analogous research conducted in different domains, as well as individuals and cohorts from other domains who have mutual, but previously unrecognized, interests.

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[4] Tenopir C., Volentine R, King D.W. "Scholarly Reading and the Value of Academic Library Collections: results of a study in six UK universities." *Insights, the journal of the UKSG (formerly Serials)*. 25(2):130-150, 2012.

[5] See: http://homepages.inf.ed.ac.uk/balex/publications/slides-ProQuest.pdf for an example of interdisciplinary research supported in part by ProQuest.

3. Providing new modalities to experience information. Just as the migration from print to online has provided new dimensions in which to access and experience content, e-resource providers must look to the future and provide new ways for individuals and teams to interact with content beyond the reading of text. Areas of development include incorporating audio and video content into e-resource platforms, interactive tools to query content and data sets, and tools for visualizing content in multidimensional formats.

Conclusion

The emergence of interdisciplinary studies creates exciting opportunities for new discoveries as scholars reach across multiple fields of study to follow their interests and passions. We believe e-resource providers such as ProQuest have an important role in bridging the breadth of research information and an array of content types from adjacent and disparate fields to support research endeavors, while also breaking silos and delivering insights. As we evolve in our support of interdisciplinary research we will foster collaboration, create serendipity and deliver new modalities in which to experience information and improve knowledge discovery.