



Can Web 2.0 Enhance Community Participation in an Institutional Repository? The Case of PocketKnowledge at Teachers College, Columbia University

by Anthony Cocciolo

This project investigates if a Web 2.0 approach to designing an institutional repository can positively impact community participation. To study this, two institutional repositories (one Web 2.0, the other not) are used within the same institution. Results indicate that the use of a Web 2.0 approach significantly enhances community participation.

BACKGROUND

By the year 2005, the term “Web 2.0” had starting gaining widespread attention after it was coined by O’Reilly Media to describe a new way of approaching the development of Web applications that focused on participation of users in connection with one another rather than on the consumption of content compiled by experts or professional cultural producers.¹ The rise of this movement, manifested in such web properties as Flickr, YouTube, and Wikipedia, peaked in 2006 when Time Magazine named person of the year as “You”, indicating the significance of massive individual contributions to the World Wide Web.² During this time and in concert with this movement, I became interested in the educational potential of Web 2.0 technologies. I was particularly compelled by some of what I was seeing on sites such as Wikipedia, where the barriers to contribution had been dropped. This was reflected in both concrete website design affordances (e.g., the edit button was prominently displayed for all users) and the attitude the site had toward user contributions (e.g., users were trusted and respected to an unusually high degree). The types of participation encouraged by such ICTs appeared to complement constructivist and democratic educational philosophies, particularly Dewey’s notion that liberty is not the freedom from having to participate, but rather “the power to be an individualized self making a distinctive contribution and enjoying in its own way the fruits of association.”³ I wondered how Web 2.0 technologies could be harnessed to create more participatory learning communities?

These interests in the educational potentials of Web 2.0 coincided with my professional role where I undertook the role of leading the new institutional repository initiative at Teachers College (TC), Columbia University. In investigating the efforts of other institutions, it appeared institutional repositories had trouble attracting a high level of participation. This was evidenced in later studies. For example, a study of the institutional repository at Cornell University has described participation, especially for faculty, as varying between low and “non-use.”⁴ Further, a survey of 40 institutions using the DSpace platform as their institutional repository found that the faculty participation rate was 4.6% per archive with a median of 1.9%.⁵ Given what appeared to be a problem of participation, my colleagues and I were committed to widespread community-use as a success factor. To advance this objective, an approach was adopted that placed emphasis on the institutional repository’s ability to connect individuals with the creative and intellectual output of one another. This can also be described as a Web 2.0 approach. This objective is not

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64 incompatible with other institutional repository initiatives, such as
 65 DSpace, which is concerned with collecting, preserving, indexing, and
 66 distributing scholarly publications within an institutional context.⁶
 67 However, the focus here is less concerned with faculty work and
 68 scholarly publications and more concerned with sharing creative and
 69 intellectually authored material, no matter what form it may come in
 70 and from whom. This paper will discuss how a Web 2.0 approach
 71 was enacted in the design and implementation of the institutional
 72 repository and ask the question, does Web 2.0 enhance community
 73 participation in an institutional repository? To address this question, a
 74 22-month usage analysis of the institutional repository developed at
 75 TC (eventually named PocketKnowledge) will be presented and
 76 compared alongside a 22-month usage analysis of its predecessor,
 77 designed in a non-Web 2.0 fashion. This analysis will follow with a
 78 discussion of the ways in which system design affects community
 79 participation and what it might mean for the further development of
 80 institutional repositories.

81 WEB 2.0: DEFINITION AND DISCUSSION

82 Establishing a definition of Web 2.0 is central to addressing the
 83 question of whether it can enhance community participation in an
 84 institution repository. Although there is debate as to whether there is
 85 such a thing as Web 2.0, the position taken here is that the term Web
 86 2.0 is indeed a worthwhile concept. Web 2.0 captures a series of
 87 design patterns and approaches to structuring web-based systems
 88 that capitalize on the networked information environment, making
 89 the web better able to support the use, production, and circulation of
 90 knowledge in a peer-to-peer networked arrangement.⁷ The reason
 91 questions persist as to whether Web 2.0 is a “real thing” is a result of
 92 the complicated notion about the concept, a great deal of marketing
 93 hype, and questions related to the development and trajectory of the
 94 Web. Several researchers have noted the difficulty of defining Web
 95 2.0. For example, Cormode and Balachander note that a “precise
 96 definition is elusive and many sites are hard to categorize with the
 97 binary label ‘Web 1.0’ or ‘Web 2.0’” and Anderson notes that “Web 2.0
 98 is a slippery character to pin down.”⁸ Anderson asks:

99 Is it a revolution in the way we use the Web? Is it another technology
 100 ‘bubble’? It rather depends on who you ask. A Web technologist will give quite
 101 a different answer to a marketing student or an economics professor.⁹

102 In addition to the hype, there are questions as to whether the term
 103 “Web 2.0” is really anything different from a more fully-developed
 104 “Web.” Anderson notes that the creator of the Web, Sir Tim Berners-
 105 Lee, disagrees that “Web 2.0” is anything different from the “Web”
 106 because connecting people was “what the Web was supposed to be all
 107 along” and Web 2.0 “is a piece of jargon.”¹⁰ Taking this perspective,
 108 Web 2.0 can be seen as “a consequence of a more fully implemented
 109 Web.”¹¹ However, Millard and Ross note “Web 2.0 (meaning the set of
 110 applications, web sites and companies that define it) is not totally
 111 analogous to the vision of the early hypertext pioneers, mainly
 112 because the attributes that they were seeking are not available
 113 ubiquitously across all the systems of the Web.”¹² They also find that
 114 “Web 2.0 has purposely rejected some of those old aspirations, and
 115 the assumptions that went with them, in favour of a more flexible,
 116 lightweight and responsive approach.”¹³ However, without question,
 117 Web 2.0 utilizes all of the same technology as Web 1.0, although it
 118 includes some new, additional technology that was not available in
 119 Web 1.0.¹⁴ Hence, it is not sufficient to say that Web 2.0 is simply the
 120 end-product of an early vision of the Web because there is not
 121 complete overlap nor is all aspects of the initial vision incorporated.

122 Although the development of Web 2.0 is difficult to pin down, the
 123 creation of the term is traced back by Anderson to the team at O’Reilly
 124 Media, Inc., who were interested in making “explicit certain features
 125 that could be used to identify a particular set of innovative companies,
 126 including business characteristics,” which was later captured in the

influential paper, “What Is Web 2.0: Design Patterns and Business
 Models for the Next Generation of Software.”¹⁵ This paper included
 the equally influential Web 2.0 meme map, which outlined the
 characteristics of a Web 2.0 environment. Some of these memes (or
 characteristics) include “radical trust” of the user, “participation”
 (“not publishing”), “tagging” (“not taxonomy”), and “software that
 gets better the more people use it.” Anderson finds that the term
 captures an important set of ideas and that it is “more than a set of
 ‘cool’ and new technologies and services.”¹⁶ These ideas that are
 deemed important to education and derived from the O’Reilly report
 include: (1) individual production and user generated content, (2)
 harnessing the power of the crowd, (3) data on an epic scale, (4)
 architecture of participation, (5) network effects, and (6) openness.
 Anderson, Cormode and Krishnamurthy also agree, despite the
 difficulty of pinning down Web 2.0, that there are salient concepts
 that distinguish Web 2.0 from Web 1.0 or just the Web. These ideas
 are manifested in concrete site features, which include:

- Users as first class entities in the system, with prominent profile
 pages, including such features as: age, sex, location, testimonials,
 or comments about the user by other users. 144-146
- The ability to form connections between users, via links to other
 users who are “friends,” membership in “groups” of various kinds,
 and subscriptions or RSS feeds of “updates” from other users. 147-149
- The ability to post content in many forms: photos, videos, blogs,
 comments and ratings on other users’ content, tagging of own or
 others’ content, and some ability to control privacy and sharing. 150-152
- Other more technical features, including a public API to allow
 third-party enhancements and “mash-ups,” and embedding of
 various rich content types (e.g., Flash videos), and communication
 with other users through internal e-mail or IM systems. 153-157

Given the high degree of coherence of what Web 2.0 is amongst
 business thinkers (e.g., O’Reilly) and researchers (e.g., Anderson),
 why is Web 2.0 so difficult to pin down? The difficulty stems from the
 contingent, social nature of Web 2.0. Anderson notes that it is
 “important to acknowledge that these ideas are not necessarily the
 preserve of ‘Web 2.0’ but are, in fact, direct or indirect reflections of the
 power of the network: the strange effects and topologies at the micro
 and macro level that a billion Internet users produce.”¹⁷ Thus, Web 2.0
 cannot simply be distilled to a technology or set of affordances, but
 must be looked at in micro-level perspective (individuals interacting
 with ICTs) and a macro-level perspective (the social, cultural, and
 network byproduct of massive micro-level interactions). Pinning
 down Web 2.0 can be difficult because although the individuals
 interacting with the environment can be viewed as rather straight-
 forward, the large-scale outcomes cannot be easily described as the
 sum of all interactions. Despite this difficulty, this paper maintains that
 it is a useful concept for describing a set of important ideas that
 manifest themselves in design patterns and ultimately in features
 available to the user. Those design patterns that are the preserve of
 Web 2.0 and were enacted in an institutional repository will be
 discussed in the following section. 178

DESIGNING AN INSTITUTIONAL REPOSITORY USING WEB 2.0 179

The basic design rationale captured in the term Web 2.0 is the notion
 that the web should be used to buttress connections between
 individuals and provide them unfettered opportunities to express
 themselves, rather than attempt to curate all possible combinations of
 knowledge resources or attempt to censor individual contributions.
 For the design of this institutional repository (PocketKnowledge),
 Web 2.0 design patterns were explicitly employed, most notably the
 patterns that (a) users can control their own data, (b) users should be
 trusted, (c) flexible tags are preferable to hierarchical taxonomies, (d)

189 the attitude should be playful, and (e) the expectation that the
 190 software gets better when more people use it.¹⁸ These patterns
 191 manifest themselves in concrete design affordances, and in some
 192 cases in combination with continued use of the system by users. For
 193 example, the pattern (a) users control their own data, is manifested in
 194 a design affordance which allows the user to post or delete any of their
 195 own content at any time. The design pattern (e) the software gets
 196 better the more people use it, is both an outcome based on the
 197 interactions of the users as well as something that is manifested in
 198 concrete design affordances. It is not easily known ahead of time if a
 199 system will be used by a large number of individuals, but the system
 200 can be designed in such a way that if it does get used it should get
 201 better with that increased interaction. For example, PocketKnowledge
 202 displays visual clues that indicate the size and composition of where
 203 the increased user activity is coming from. The colors indicate the role
 204 of the contributor (student, faculty, staff, other) and the size of the pie
 205 chart provides a visual clue of the extent of that interaction (see
 206 Fig. 1). This feature is enacted in the system design and becomes more
 207 useful once the system gets used more heavily.
 208

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 213 **data, b) users should be trusted, c) flexible tags**
 214 **are preferable to hierarchical taxonomies, d)**
 215 **the attitude should be playful, and e) the**
 216 **expectation that the software gets better when**
 217 **more people use it.”**

218 These particular design patterns are made particularly salient
 219 when compared against other similar systems that do not use Web 2.0
 220 design patterns. For example, a system in use for the same community

(Teachers College) called the Community Program Collections (CPC) 221
 aimed to provide the same basic functionality of allowing community 222
 members to share their knowledge products and resources they think 223
 others would find useful. However, CPC did not specifically employ 224
 Web 2.0 design patterns. Instead, it used more traditional hierarchical 225
 models, such as (a) organizing information based on a taxonomy 226
 derived from institutional structures (e.g., programs and depart- 227
 ments), (b) lack of user control over their own content (e.g., a user 228
 cannot remove their content from the site), and (c) centrality of 229
 authority (e.g., a user can only suggest content to be added to the 230
 collection; however, ultimate authority resides with an institutional 231
 librarian). These design patterns are manifested in concrete design 232
 affordances, or the omission of design affordances (such as the lack of 233
 a “Delete” button or inability to add new categories of classification). 234
 Fig. 2 is a screen capture from CPC that illustrates how information is 235
 organized according to institutional structures. 236

The design differences exhibited in PocketKnowledge and CPC are 237
 most evident when viewed in terms of affordances and constraints.¹⁹ 238
 With a web-based system, this refers specifically to those functions 239
 and features that allow a user to accomplish some action, as well as 240
 the barriers (intentional and unintentional) that the system enforces. 241
 One particularly salient constraint that CPC enforces is the inability for 242
 users to directly post materials to the system, but rather to make 243
 “suggestions” for addition. Before a user is allowed to make a 244
 suggestion, a warning message is displayed in caps and bold that 245
 reads “IMPORTANT—PLEASE READ CAREFULLY” as well as a three 246
 paragraph statement on copyright (see Fig. 3). 247

After a user makes a suggestion, the system displays the following 248
 message: 249

Thank you for your suggestion. We will review the item, and if possible, make 250
 it a part of the Arts & Humanities Program Collection. You will receive an e- 251
 mail either way. 252

This particular set of constraints highlights certain attitudes 253
 toward the end-user. First, the warning message in bold and caps 254
 indicates that the system distrusts that the user will read the 255
 256

Figure 1

Individuals Maintain a High Degree of Control (A User's View of His Collection of Materials in Pocketknowledge)

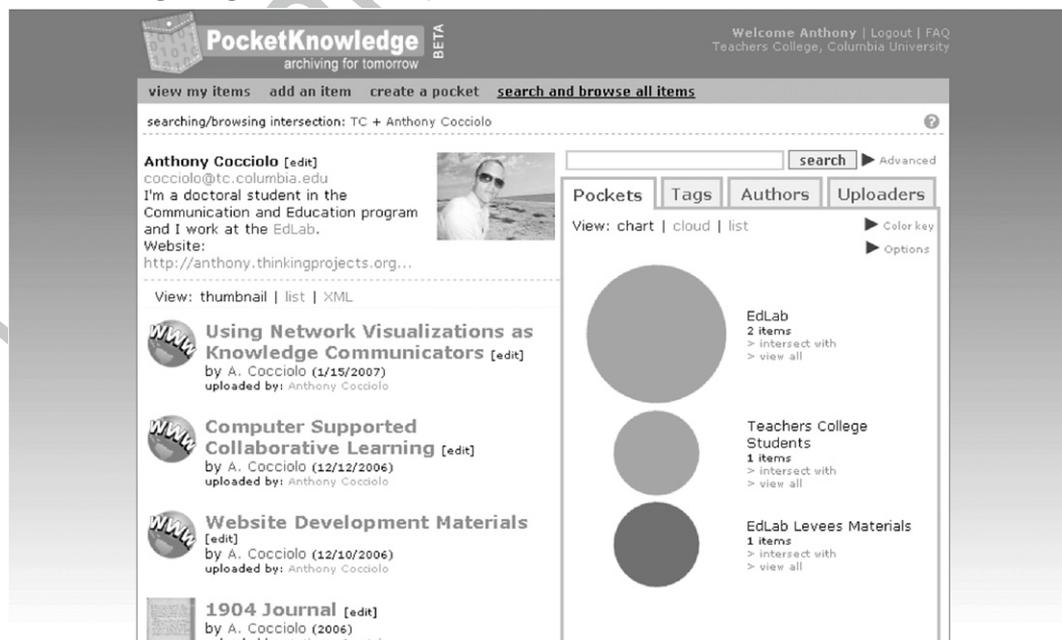


Figure 2
Community Program Collections (CPC) is Organized by Institutional

teachers college
LIBRARY
 the primary source in education

Search the TC Catalog: Title [] go

Welcome Anthony | Sign Out | Library Information | TC Home | Columbia University Libraries

Library Home
Catalogs & Databases

Program Collections

- Arts & Humanities
- Biobehavioral Sciences
- Counseling and Clinical Psychology
- Curriculum & Teaching
- Health and Behavior Studies
- Human Development

Biobehavioral Sciences
 (Suggest materials to be added to this program collection)

Search within this Collection: [] go

Selected Readings

Show: All Readings [] sort

A Comparative Study of Arterial Compliance and Associated Autonomic Modulation between Young African-American and Non-African-American Males
 Dissertation | 2002
 By: Adrienne Stevens Zion
 Hypertension (HT) presents a common public health challenge because of its prevalence and associated increase in co-morbid cardiovascular diseases...

Selected Books

A Celebration of Neurons: An Educator's Guide to the Human Brain
 July 15, 1995
 By: Robert Sylwester
 Robert Sylwester offers educators an introduction to "the only mass of matter in the known universe that can contemplate itself," the human brain.
 Find in TC Library | Purchase from Amazon.com

Classics in Movement Science
 May 1, 2001
 By: Mark L Latash & Vladimir M Zatsiorsky
 This volume presents thirteen selections from classical works in the areas of biomechanics, motor control, and the neurophysiology of movement.
 Find in TC Library | Purchase from Amazon.com

Communication Disorders Sourcebook ..
 1996

Discussion

There are currently no discussion posts related to this program collection.

Post a Comment | Read All

Selected Web Resources

Show: All Web Resources [] sort

American Academy of Audiology (AAA)
 Professional Organization
 Its mission statement is to promote quality hearing and balance care by advancing the profession of audiology through leadership, advocacy, education, public awareness and support of research...

American Annals of the Deaf
 Journal
 For more than 150 years the Annals has

257 copyright statement. Secondly, the system reinforces the knowledge
 258 authority relationship between library or university and the individ-
 259 ual by allowing users only to make "suggestions" and if a suggestion is
 260 made, it must be "reviewed." Given these set of constraints, it is
 261 plausible to believe that many users, especially those who are less
 262 confident in their knowledge expertise (e.g., students), would hesitate
 263 to make a suggestion out of fear of being rejected by the knowledge
 264 authority.

265 This design approach is in sharp contrast to PocketKnowledge,
 266 which allows any user to post any files instantly and trusts that an
 267 addition does not violate copyright laws. Fig. 4 shows the "add an
 268 item" window, which asks the user if the file violates copyright laws,
 269 giving the option for cases where the user "doesn't know" if copyright

would be violated. This type of design choice illustrates that the
 270 system trusts the user to a high degree, with the realization that true
 271 violations of copyright are relatively rare and can be handled on a
 272 case-by-case basis.

273
 274 In sum, this singular example illustrates a broad distinction in
 275 design approach between PocketKnowledge and CPC systems. The
 276 point is that differences in design patterns, which manifest them-
 277 selves in design affordances that look to promote certain user
 278 outcomes (e.g., a system getting better as more people use it), lead
 279 to very different systems when employed in practice. Because of the
 280 importance of the design approach, several more examples of how
 281 Web 2.0 design patterns are captured in PocketKnowledge will be
 282 discussed.

Figure 3
CPC Shows a Warning Message and Information on Copyright before a Suggestion can be made

Suggest an Addition to the Arts & Humanities Program Collection

IMPORTANT — PLEASE READ CAREFULLY

If the library owns the copyright, or has explicit permission to display a copyrighted work, then the library can display the full copyrighted work from this web site. If the library does not own the copyright, or has not been granted the proper permissions from the copyright holder, then the most the library can do is provide a link to the item.

Given these copyright restrictions, please upload files only if (a) you are the copyright owner, and (b) are granting the library permission to display the work from this library site.

If you do not own the copyright for the work you are suggesting, you may provide a link to that work, and we will make every effort to send library patrons to the proper, third-party web site.

Please choose a method:

<input checked="" type="radio"/>	I will provide a link
<input type="radio"/>	I will upload a file (you must be the copyright owner to do so).
<input type="radio"/>	I have no link or file, but I do have the following suggestion:
	<input type="text"/>

Figure 4
PocketKnowledge includes a Simplified Copyright Compliance Policy

upload file:

Title:

Author #1

Firstname:

Lastname/Organization:

role: faculty staff student other

Published/Created Date: (mm/dd/yyyy or mm/yyyy or yyyy)

Abstract/Description:

Tags: ?

(separate tags with commas or new lines)

Copyright: Is there a copyright issue related to uploading this document to PocketKnowledge?
 Yes No Don't Know ?

Permissions: I would like this item to be accessible to: ?

283
 284
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“Many [institutional repositories], especially those used in higher education and academic libraries, go to great lengths to ensure that information is secure and cannot be changed by anyone other than a select few.”

289 One important design pattern captured under the term Web 2.0 is
 290 the idea that you trust the community to a high degree. This notion is
 291 captured in Fig. 5, where any logged-in user can change the name and
 292 about entries for a pocket (a pocket is similar to a collection). Many
 293 systems, especially those used in higher education and academic
 294 libraries, go to great lengths to ensure that information is secure and
 295 cannot be changed by anyone other than a select few. The Web 2.0
 296 paradigm reverses this trend and allows anyone to edit these entries,
 297 which is a radical break from more traditional arrangements. Tapscott
 298 and Williams describe how a Web 2.0 approach is indeed a radical
 299 break:

300 If you consider the vernacular, the term “open” is loaded—rich with meaning
 301 and positive connotations. Among other things, openness is associated with
 302 candor, transparency, freedom, flexibility, expansiveness, engagement, and
 303 access. Open, however, is not an adjective often used to describe the
 304 traditional firm, and until recently, open would not have appropriately
 305 described the inner works of the economy either.²⁰

306 Although Tapscott and Williams are speaking of the corporate
 307 firm and the economy, the use of openness within higher education
 308 technologies was rare as well. For example, the learning manage-
 309 ment system (such as Blackboard, Web CT, among others) created a
 310 hierarchy of roles, beginning at the top administrative level and
 311 bestowing greater privilege on the instructor, and less privilege on
 312 the student, and little or none to the unaffiliated with the institution.
 313 This trend of providing varying levels of control based on
 314 institutional role is pervasive in higher education and the prospect

of moving away from that arrangement concerned individuals across 315
 the library organization. For example, when it came time to roll-out 316
 PocketKnowledge to the community, it was collectively decided that 317
 database backups should be very frequent in case “trusting the 318
 community” did not work and entries were defaced. In the over 319
 2-year period that PocketKnowledge has been available to the TC 320
 community, restoring data because of destruction by disaffected 321
 community members was never needed. Rather, no acts ever 322
 occurred that could be considered transgressive (e.g., illegal, 323
 derogatory or offensive). 324

Zittrain draws on the work on the urban planner Hans Monderman 325
 to suggest that online environments can function like urban 326
 environments: if some of the external rules and signs are removed, 327
 the result could be a safer environment in which people can function 328
 and one in which individuals act more humanly toward one 329
 another.²¹ Zittrain finds that this approach has borne out in the 330
 European city of Drachten, which has removed its traffic signs, parking 331
 meters and parking spaces, and has seen a dramatic improvement in 332
 vehicular safety. He finds that: 333

334 More generally, order may remain when people see themselves as a part of a
 335 social system, a group of people—more than utter strangers but less than
 336 friends—with some overlap in outlook and goals. Whatever counts as a
 337 satisfying explanation, we see that sometimes the absence of law has not
 338 resulted in the absence of order. Under the right circumstances, people will
 339 behave charitably toward one another in the comparative absence or
 340 enforcement of rules that would otherwise compel that charity.²²

Zittrain uses the urban planning example to explain the workabil- 341
 ity and success of Wikipedia, finding that the lack of explicit rules 342
 causes individuals to have to communicate with one another and 343
 come to agreement on the proper way things should function. This 344
 explanation may explain why community trust is a design pattern 345
 that works in practice for Wikipedia and PocketKnowledge: indivi- 346
 duals feel respected and treat others with such respect when they are 347
 trusted to behave in a socially constructive manner. Despite the 348
 workability of both examples, further research is required to firmly 349

Figure 5
Illustrates the Design Pattern that you Trust the Community to a High Degree

The screenshot shows the 'edit pocket' interface on the PocketKnowledge website. At the top, there is a navigation bar with links: 'view my items', 'add an item', 'create a pocket', and 'search and browse all items'. The page title is 'PocketKnowledge archiving for tomorrow BETA'. On the right, there are links for 'Welcome Pocket', 'Logout', 'FAQ', 'Teachers College, Columbia University', and 'Administrators'. The main form contains the following fields:

- Name:** Maxine Greene Collection
- About:** Maxine Greene is a professor of philosophy and education and the William F. Russell Professor in the Foundations of Education (emerita) at Teachers College, Columbia University, where she continues to teach a course in educational philosophy, social theory, and aesthetics.
- Website:** http://www.maxinegreene.org
- RSS Feed:** [Empty field]
- iTunes Link:** [Empty field]
- Make this pocket a sub-pocket of another?:** Yes (selected) No
- Sub-Pocket of:** Teachers College Emeriti Faculty
- Picture:** [Image of Maxine Greene] [Browse... button]

At the bottom of the form are two buttons: 'Edit Pocket' and 'Delete Pocket'.

350 establish Zittrain's observation with respect to individual behavior in
 351 web-based systems.

352 Another important Web 2.0 design pattern is the non-authorita-
 353 tive information organization. This is the idea that a central authority
 354 cannot decide ahead of time all the possible meta-data words,
 355 phrases, or combinations that can be used to describe content. The
 356 premise of non-authoritative information organizations is that users
 357 themselves know best how to describe the information that they are
 358 providing since they are often the creators of the information. In
 359 PocketKnowledge, information can be organized based on tags, which
 360 is a descriptor a user decides to assign to the contribution he provides.
 361 This design pattern is related to the notion of community trust: if a
 362 member of the community is able to create his own content, there is a
 363 high likelihood that he should be able to describe it using a few
 364 phrases or tags that others can understand. The basic notion is that if
 365 an individual is contributing some distinctive piece of work, he wants
 366 it to be accessible to others as clearly as possible. The best way to do
 367 this is to describe it appropriately.

368 A further design pattern captured under the term Web 2.0 is the
 369 notion that the system should be fun and playful. The notion of
 370 enjoyment and play are central to understanding the motivations and
 371 inner-workings of successful participatory communities, and thus
 372 should be instantiated into the design of the ICT. For example, Benkler
 373 discusses the role of enjoyment in motivating the types of social
 374 production exhibited on the Internet:

375 For all of us, there comes a time on any given day, week, and month every year
 376 and in different degrees over our lifetimes, when we choose to act in some
 377 way that is oriented towards fulfilling our social and psychological needs, not
 378 our market-exchangeable needs. It is that part of our lives and our
 379 motivational structure that social production taps, and on which it thrives.

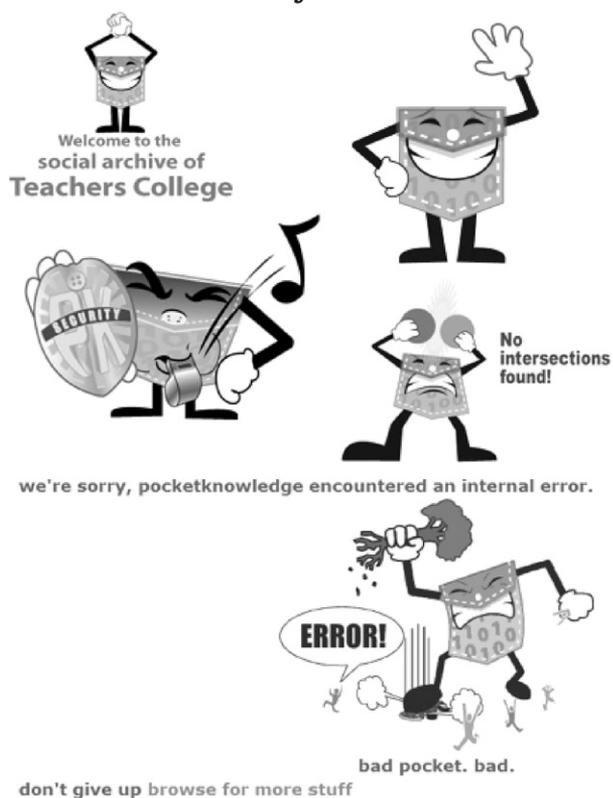
There is nothing mysterious about this. It is evident to any of us who rush
 home to our family or to a restaurant or bar with friend at the end of a
 workday, rather than staying on for another hour of overtime or to increase
 our billable hours; or at least regret it when we cannot.²³

As described by Benkler, enjoyment and fun (however that is
 defined for the individual) are central to the Web 2.0 approach.
 One way to make people feel more playful and at-ease is to
 integrate fun imagery into the ICT design. With regard to Pocket-
 Knowledge, this is accomplished through the use of playful icono-
 graphy (see Fig. 6). The iconography is playful, welcoming, and
 makes light of serious situations (like system errors). The notion is
 that people will have more fun (and be more open to participating)
 if they feel at ease and welcomed. This is rather different from
 many other academic technologies, which embody a certain
 seriousness that may not engage individuals' intrinsic motivations
 for enjoyment and well-being.

**“[Users] also have the option to remove
 anything they have uploaded at any time. This
 differs from many institutional repositories,
 where new contributions need to approval to be
 added or removed.”**

The second to last design pattern captured under the term Web 2.0
 is the pattern that users maintain a high degree of control. This
 pattern is enacted in PocketKnowledge by allowing users to upload a
 profile picture, enter a description of themselves, and upload and

Figure 6
The “Playful Attitude” Design Pattern is Instantiated into PocketKnowledge. Imagery Created by Ian Toledo



them to see for themselves that the system is getting more interesting and engaging the more it is used.

In conclusion, Web 2.0 design patterns were explicitly employed in PocketKnowledge to promote greater participation and involvement by the community. These patterns include: (a) users control their own data, (b) users should be trusted, (c) flexible tags are preferable to hierarchical taxonomies, (d) the attitude should be playful, and (e) the expectation that the software gets better when more people use it. All of these patterns were instantiated in system design and affordances. In the case of “the software gets better when more people use it,” this pattern is instantiated in the system design and is an outcome of continued use of the system.

RESEARCH OVERVIEW

To study if Web 2.0 design impacts community participation, this study will compare two institutional repositories used by the same community across two continuous (and non-overlapping) periods of time, with one system explicitly designed with Web 2.0 design patterns and the other not. The Web 2.0 system is PocketKnowledge, and the non-Web 2.0 system is Community Program Collections, both described in the previous section. Both systems provide the basic functionality of sharing intellectually authored materials, such as publications, working papers, research data, and audio/video content. Additionally, both were prominently highlighted on the Teachers College library homepage.

The context for this investigation is the community of students, faculty and staff at Teachers College, Columbia University, a large graduate and professional school of education located in New York City. The demographics for TC are the following (from the 2008 to 2009 school year): 5117 students (3234 Masters, 1584 Doctoral, and 229 Non-degree); 31.8% full-time and 62.8% part-time; 76.6% female and 23% male; average age of student is 31; 12% are international students; and 260 faculty and approximately 400 professional staff.

This investigation will test the following hypothesis: the Web 2.0 institutional repository generated greater community participation than the non-Web 2.0 institutional repository.

DATA AND METHODS

Data were collected from Community Program Collections from November 2004 to August 2006 (22 months). These data included the contribution made to the system (through the suggested additions interface) and information on the role of the contributor (e.g., faculty, staff, student). Data for PocketKnowledge were gathered from September 2006 to July 2008 (22 months), and included information on both the contribution and contributor. To illustrate participation, the study will use frequency counts of contribution. Contributions made by library staff members, such as making available archival collections or other works, have been excluded from the data set because our focus is on community participation and not library staff.

RESULTS

This hypothesis is borne out: the Web 2.0 system garnered significantly more community participation than the non-Web 2.0 system, as illustrated by the 9,728% increase in user contributions (from 54 to 5,307 contributions, see Table 1). Important calculations include the fact that 23% of the faculty (both tenure and non-tenure track) made at least one contribution to the Web 2.0 institutional repository. Another remarkable trend is the reversal in use patterns. The non-Web 2.0 system prompted involvement primarily from faculty, which is illustrated by the fact that 59% of all contributions were made by faculty. This trend is reversed in the Web 2.0 system, where 79% of the contributions are from students and 10% are from faculty. However, as a group, the faculty is better represented (in terms of distinct contributors) on the Web 2.0 IR (23%) as compared to the student body (9%). This would suggest that a healthy balance

download anything they want. They also have the option to remove anything they have uploaded at any time. This differs from many institutional repositories, where new contributions need to approval to be added or removed. Users also have a high degree of control by being able to assign their work to any pocket (there are hundreds of pockets available at this time), assign extra fields to describe their work, and describe how their respective roles will be displayed to outside users (this is especially helpful for users who may be students, faculty, staff, or other roles at different times throughout their affiliation with TC). Users are also allowed to keep their accounts for life (e.g., the username and password will continue to operate after the institutional affiliation ends). Users can also decide who has permissions to access their work (only themselves, a group of friends, the entire University—available with an institutional login, or the whole Internet). They also have the option to create their own pockets, assign friends or colleagues to them, and read an RSS feed from their personal blog. Hence, providing users with extensive control illustrates that the system designers trust the users to a high degree, which may prompt greater involvement.

The last Web 2.0 design pattern captures the idea that the system gets better the more people that use it. This design pattern is enacted in PocketKnowledge by visually showing users the extent of user-contributed content available to them. This display of user activity may encourage new users to become involved and contribute. Tag clouds and pie charts are used to illustrate where user activity is coming from. These visualizations can be toggled between different factors that a user may be interested in, such as who has the most contributions by volume, the most recent contributions, and the most commented-on content. Providing individuals these options allows

Table 1
Community Contributions from Web 2.0 and Non-Web 2.0 Institutional Repositories

		Faculty	Staff	Students	Total
t1.1	Non-Web 2.0 IR	32 (59%)	16 (30%)	6 (11%)	54 (100%)
t1.2	Web 2.0 IR	511 (10%)	580 (11%)	4,216 (79%)	5,307 (100%)
t1.3	Number of contributions (% of all contributions)				
t1.4	Individuals who made at least one contribution (% of total population)	60 (23%)	14 (4%)	430 (8%)	504 (9%)
t1.5	Individuals who created an account (% of total population)	77 (30%)	42 (11%)	1,604 (31%)	1,723 (30%)

has developed: the Web 2.0 environment is a comfortable environment for students to share their intellectual creations and is simultaneously not an alienating space for faculty (e.g., viewed as not serious or worth his time). Possible reasons for the workability of this model is that faculty may be interested in having their work more widely read by students (which could help attract the best students to work with and have in class), and students appreciate having a meaningful space to share their creations (e.g., sharing work with colleagues and friends). However, there is still much room for improvement: although 31% of the student body has created a user account for the Web 2.0 IR, only 8% of the student body has actually contributed.

“The non-Web 2.0 system prompted involvement primarily from faculty This trend is reversed in the Web 2.0 system, where 79% of the contributions are from students and 10% are from faculty.”

RESEARCH LIMITATIONS

This study has several strengths but also has a series of limitations. With respect to methodology, this study has the limitation of being a study of two cases and is hence unable to make scientifically precise comparisons between factors (such as specific design decisions) that may be more possible by using an experimental design. For example, it is possible to imagine setting up an experimental design that teases out how particular design decisions prompted certain kinds of user behaviors using a variety of control and experimental conditions. This would be important work that could follow from the present study that shows general design decisions' effects. However, this project has the strength of perhaps more accurately capturing “in the world” user activity than studies using either an artificial context (a tool or condition that would not be realistically used) or user population (individuals who may only be doing something for the sake of the study).

Related to this issue of methodology is the issue of the data that was collected, which does not capture the verbal or written utterances from the user population with regard to how they felt the ICT was impacting himself or the community. Hence, this study does not capture the rich qualitative data that is often used in ethnographies and strongly qualitative studies.

Although this study was interested in shedding light on how Web 2.0 technologies are used in learning environments, both the tool (PocketKnowledge) and the community (Teachers College) may not entirely represent either Web 2.0 or other learning communities. For example, it is possible to imagine some Web 2.0 environments that share some but not all of the design patterns with PocketKnowledge. Similarly, the Teachers College community is at-best illustrative of a graduate-level learning community and may not well represent other

contexts, such as undergraduate learning communities or other institutional contexts.

The final limitation is that since the study spanned a period of 44 months, the user community may not be completely consistent (e.g., students graduate, faculty and staff take other jobs). And since this is a relatively long time period, individual's comfort (and willingness to use online technologies) may have changed over time. For example, an individual may have been more willing to use an institutional repository in the year 2008 versus 2004 because he is more comfortable with online technology in 2008. However, none of these limitations seriously detract from the major finding that greater community participation resulted from a Web 2.0 approach.

DISCUSSION

The case of PocketKnowledge at Teachers College illustrates that Web 2.0 design patterns and approaches have a great deal of potential for enhancing participation in institutional repositories. The increase in participation can be attributed to a system design approach that looks to buttress connections between individuals and provide them unfettered opportunities to express themselves, rather than attempt to curate all possible combinations of knowledge resources or attempt to censor individual contributions. This approach is enacted using Web 2.0 design patterns, particularly: (a) users control their own data, (b) users should be trusted, (c) flexible tags are preferable to hierarchical taxonomies, (d) the attitude should be playful, and (e) the expectation that the software gets better when more people use it.

Given the results of this study and on a more fundamental level, why would a Web 2.0 approach to an institutional repository lead to greater community participation? Although this study only looked at participation rates and not at motivations for individual contributors, we can begin to extrapolate. A limitation with some of the earliest approaches to institutional repositories is that they focused on library goals (such as collecting and preserving scholarly work), and yet did not directly tap into the motivations of faculty members to contribute. Davis and Connolly make note of this, quoting the Mellon-sponsored study of scholarly communication that found that “approaches that try to ‘move’ faculty and deeply embedded value systems toward new forms of archival, ‘final’ publication are destined largely to failure in the short term.”²⁵ From this study, it would appear that faculty has no motivation for contributing to an institutional archive. However, fairly good faculty participation was evidenced in this study. How can these two positions be reconciled? I would argue that institutional repositories have more potential to motivate faculty contributions through their roles as teachers rather than as researchers. By this I mean that the faculty is interested in improving the classroom-based experience by having students as well versed and engaged within their area of expertise as possible. If a faculty member perceives that students are participating and consuming work within an institutional repository, they may feel more motivated to contribute their work in hopes that students will become familiar with it. Thus, strong student participation in an institutional repository could lead to greater faculty participation.

597 However, it is important that the repository remain mostly academic
 598 or risk faculty perceiving it simply as a social space for students. This
 599 prospect makes sense on another level. Davis and Connolly note that
 600 faculty identify with an “international community of researchers
 601 working in a narrow discipline” more strongly than their own
 602 institution.²⁶ However, teaching is primarily done at an institutional
 603 (or local) level than international level. Hence, making an institu-
 604 tional repository more focused on teaching (which happens at the
 605 institution) than on research (which primarily interests international
 606 researchers) could more fully engage the intrinsic motivations of
 607 faculty.

608 In conclusion, this paper suggests that institutional repositories
 609 may garner greater community participation by shifting the focus
 610 from library goals (such as an interest in preserving and indexing the
 611 scholarly work of the institution) to one that focuses on building
 612 localized teaching and learning communities through connecting
 613 individuals with the creative and intellectual output of one another.
 614 By creating a system for supporting such exchange, library goals are
 615 advanced because a more detailed record of intellectual activity at the
 616 institution is stored and preserved than would be possible by simply
 617 storing the scholarly work of faculty. In order to make possible such a
 618 system for connecting individuals, Web 2.0 offers a set of approaches
 619 and design patterns for creating systems that help promote greater
 620 community participation. And lastly, greater student participation in
 621 an institutional repository may prompt greater faculty involvement
 622 because the institutional repository becomes more focused on the
 623 teaching and learning community than the research community. This
 624 is a sensible arrangement: teaching and learning has tended to occur
 625 at the institution, where the research community has tended to occur
 626 at an international-level.
 627

628 **“...this paper suggests that institutional**
 629 **repositories may garner greater community**
 630 **participation by shifting the focus from**
 631 **library goals (such as an interest in**
 632 **preserving and indexing the scholarly work of**
 633 **the institution) to one that focuses on**
 634 **building localized teaching and learning**
 635 **communities through connecting individuals**
 636 **with the creative and intellectual output of**
 637 **one another.”**

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644 NOTES AND REFERENCES

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