Leveraging Mobile Technology for m-Learning: 3rd Generation Threaded Discussions

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Abstract

Emerging mobile technologies hold great promise for educational institutions seeking to extend the learning experience to an increasingly nomadic and time-challenged student community, especially at urban campuses where both faculty and students typically commute to school and struggle to multi-processes work, study and family time and location demands. The ability to reach out and engage learners, unconstrained by physical location, enables true anytime/anyplace access, helping combat the out-of-site/out-of-mind effect and leverage time otherwise wasted sitting in traffic or standing in line. This paper proposes a "third generation" (3G) threaded discussion facility that exploits mobile technology to enhance collaborative learning by adding a real-time, location-independent "push" dimension to this valuable, but previously passive, pull-oriented, paradigm.

1. Introduction

These Recently, threaded discussion has been widely adopted by the academic community as a collaborative learning technique and, despite its inherent limitations, its value as such has been well-established. In the 1980's, the Unix-based Usenet and dial up bulletin boards defined the first generation of threaded discussion and the geo-dispersed community phenomenon was established. Then, in the 90's, the availability of Web-based, hosted (typically free) discussion group services brought a new level of accessibility and usability for both students and instructors, clearing the way for this second generation incarnation to become a mainstay of the emerging learner-centric educational pedagogy. Today threaded discussions are a standard component of web-supported courses. Live discussions begun during class are continued outside, new tangential ones are spawned spontaneously and learning occurs, often without the instructor intervention, as students build upon each other's ideas.

The benefits are clear and tangible, yet limited still, in this second generation, by 1) the fact that, for the most part, discussion groups are accessible only via personal computers (PC's) and 2) the passive nature of the medium-–the burden lies with the discussion participants to monitor the discussion site to check for new activity. It is easy to imagine an urban university student, working all day on the computer at the campus lab, never thinking to check the discussion site, only to have it come to mind during the evening commute when the necessary technology is out of reach. If it should come to mind again when back within range of a networked PC, the student might eagerly head to the discussion site only to find nothing posted since the previous check. And who can blame the other participants for not responding when they are equally constrained by the technology's limits?

When discussion activity is low, frequent checks of the site will disappoint participants, dampen their enthusiasm and lead to less frequent checking which in turn lowers activity further, feeding a vicious cycle toward extended periods of dormancy. A posting might generate a reply within minutes but the original author, having no reason to expect such a prompt reply, might only think to check again days later. Meanwhile the reply's author has been eagerly checking, in vain, for a response to the reply. Hiltz [3] notes the frustration associated with unpredictable response times as a major

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shortcoming of such asynchronous learning systems. Some discussion services provide a partial remedy by alerting authors, via email, that a reply has been posted, but this only improves things incrementally and only if participants check email more frequently than the discussion site. Without email pagers like the RIM Blackberry, participants are still bound by any physical location constraints that hamper their TCP/IP connectivity.

Emerging mobile technologies provide a vehicle for evolving threaded discussion to a third generation that better emulates face-to-face discussions by delivering the discourse, in device-scaled form, to the participants in real time wherever they are. Thus, the 3G threaded discussion is liberated from the desktop and the qualities of dynamism and immediacy found in "instant messenger" services are extended to the geo-dispersed discussion, taking the paradigm from "pull," beyond "push," to a "reach" orientation.

2. Background and Motivation

In 1979, two graduate students at Duke University created the first networked discussion facility, introducing the world to the concept of asynchronous, physically distributed group communication at an average of two postings/day across three sites. As the system evolved into what would be known as Usenet, growth nearly doubled annually and in 1988, there were 1800 postings/day distributed to 11,000 sites. (see Netizens: An Anthology at http://www.columbia.edu/~rh120/) Considering that it predates the Web phenomenon, this level of growth was particularly extraordinary and a testament to the perceived value of this new communication medium that thrived despite the awkward interface it sported in this first generation. By the time the Web exploded onto the scene, the threaded discussion paradigm was well established as "bulletin boards" proliferated with the help of more sophisticated interface software such as First Class, so the transition to the browser platform was an obvious step that followed quickly.

The advent of the Web brought threaded discussion to the world at large and, with the availability of open source CGI scripts (ie. Matt's Script Archive), discussion groups were soon a standard web site component. Venture capitalists seeking e-Commerce opportunities then seized the concept of online "communities" and by the fall of 1998, the second generation of threaded discussion had arrived in the form of user-friendly, hosted (usually free) services such as Yahoo Clubs, Excite Communities and e-Groups (later acquired by Yahoo; see http://www.forbes.com/2000/06/29/mu10.html). The value of threaded discussion in education had already been recognized ([1], [2], [4]), but this new level of accessibility and ease of use was a catalyst for widespread adoption in learning environments and all online course delivery solutions, such as those from WebCT and Blackboard, now include threaded discussion as a standard component. (See feature comparison at http://www.marshall.edu/it/cit/webct/compare/comparison.html)

In the fall of 1993, Apple launched the general-purpose mobile computing revolution (prematurely, some would argue) by announcing the first serious Personal Digital Assistant (PDA), the Newton, doomed to failure by its handwriting recognition problems and lack of connectivity. Then, in 1996 U.S. Robotics introduced the Pilot 1000, later to become the Palm Pilot (http://www.palm.com), which in turn spawned rival Handspring (http://www.handspring.com) in 1998, maker of the Visor, and others. In August of 1999, Palm announced a limited "clipping" form of web connectivity and, with service providers like OmniSky, the necessary elements came together to begin integrating network-based services into everyday life.

The convergence of the Web with mobile computing and communication continues to accelerate as the support infrastructure for advanced capabilities develops. Today, the Research in Motion (RIM) Blackberry enables full email capabilities via a pager-like device and the Kyocera SmartPhone runs the Palm OS and features a built-in HTML browser. The popular ICQ service (http://www.icq.com) has released versions for the Palm OS and Pocket PC (1.0 beta) and now integrates Short Message System (SMS) technology worldwide for a growing number of cellular networks around the world. As of October 2002, hybrid mobile communicator/web access devices are available from Handspring, Nokia, Research in Motion, and T-Mobile, with both a Microsoft-developed Pocket PC device and the new Sidekick, another combination cell phone/email/browser running on a continuous connection over T-Mobile's "2.5G" General Packet Radio Service (GPRS). Meanwhile, America Online has announced the availability of their Instant Messenger service to Verizon Wireless customers via SMS.

A number of vendors have entered the market for web service middleware to enable content delivery over mobile networks of heterogeneous devices. Sahai and Machiraju [7] describe the development of Total e-Mobile, Hewlett-Packard's (HP) infrastructure for delivering e-services to the heterogeneous mobile computing/communications community using a "One URL fits all"® approach that "scales" a single web page to the requesting device, be it a pager, phone, PDA or

PC. HP has since chosen to withdraw from this market, but the principle remains a driving force for other competitors such as Cisco with their Content Transformation Engine (CTE) 1400 series of devices.

Enabled by the mobilization and convergence of these technologies, previously unimaginable capabilities begin to surface in a wide array of applications, one of which is learning. HP has developed a vision of the mobile-enriched world they call Cooltown where environment-sensitive wireless devices integrate sophisticated e-services into every aspect of daily life, especially learning. In a streaming video dramatization at http://cooltown.hp.com/, a car develops engine trouble, alerts the driver and then directs him to the nearest service station while it sends his information ahead to the mechanics and calls him a cab. The learning segment depicts the home as an active learning environment for a language lesson. As a young girl wanders about the house, various objects "announce" themselves in Spanish through a wristwatch device she wears that displays the word and "pronounces" it aloud.

Commercial implementations of "m-learning" have been established for corporate training already. Powell [6] describes a number of implementations including Global Knowledge's eSentials designed for Palm devices and KnowledgeNet Mobile for Pocket PC's. ObjectJ pitches their NextMove product as a "mobile learning solution" running on iPaq's and, like KnowledgeNet, uses Macromedia's Flash to deliver lessons with multimedia animation. According to Powell [6], the academic world is moving in this direction too and the Stanford Law School has employed Cisco's CTE technology to provide mobile access to class lists, tests, etc.

While true anytime/anywhere access to course materials is clearly a valuable contribution of the technology, particularly for objectivist model learning, we know that much learning falls into the constructivist model category where learning occurs through the collaborative process of interaction with instructors and peers. But current generation discussion group implementations still suffer from issues such as delayed response (Hiltz[3]) and Picciano[5] found that presence perceptions could affect performance on writing assignments. Clearly, issues of responsiveness and presence are ones that might be mitigated by the higher levels of interconnectedness that true anytime/anywhere access could provide. With this in mind, the 3G threaded discussion facility conceptualized below is a speculation on how this valuable learning tool might be similarly enhanced by leveraging mobile technology.

3. m-Learning and 3G Threaded Discussion

In its mobile-enabled 3G form, threaded discussion will afford a greater sense of synchronicity and dynamism as participants are apprised of activity as it occurs and, depending on their individual device, may be able to respond immediately. This is particularly valuable in a learning context since students come together for only a brief period and then disperse (widely in the urban campus case) and engage in unrelated work, family or leisure time activities. As a learning tool, threaded discussion allows the classroom discourse to be continued beyond class meeting times, and in the 3G case, reaches out to students wherever they are, infusing the learning process into heretofore inaccessible aspects of their nomadic lives.

The 3G threaded discussion then enables a kind of m-learning outside of class as a posting alert catches the attention of whichever students are available at the time, wherever they may be, and are willing to engage. If the timing is right, a critical mass develops, sparking a lively synchronous debate. If not, the discussion remains asynchronous for the time being but the time until the next posting is likely to be reduced since students are aware that a posting awaits them. Thus, as discussion sub-groups develop, evolve and dissipate fluidly in real time, this 3G version of threaded discussion will enjoy higher activity levels, greater intensity, wider student participation, enhanced thread momentum, and a compressed time to thread resolution, fundamentally enhancing the learning experience.

3G threaded discussion interaction will be tailored to the capabilities and preferences of individual participants though customizable agents to optimize effectiveness and to prevent intrusiveness and the annoyance associated with information overload. Consider the following scenarios that illustrate the possibilities:

Students are often especially interested in postings from particular participants such as a top student known to make useful contributions or the course professor, since those may contain imperative information about changes to the schedule or assignments. A student with a basic pager could configure the mobile agent accordingly as:

"Whenever the professor or student Elaine T. Braine posts to the discussion, then page me at (504) 341-1221 with code 911."

Sometimes particular topics are of primary interest. A graduating senior with an SMS pager might request the following:

"Whenever a posting includes keyword(s) exam (or synonym) or job (or synonym), then message me at (302) 854-9881 with the first 250 characters of the post."

In other cases, the timing is the critical factor:

"Whenever there is a posting the night before an exam, then send the full text of the posting to my WAP-enabled phone at (923) 323-0021."

In addition to global settings like those above, thread or posting-specific instructions are useful:

"Whenever there is a posting on the thread "Ideas for Term Papers," then send an active web page of the thread to my Palm OS-based PDA at IP address 127.116.108.43."

The above represents a "standing" HTML request, triggered by postings to the specified thread to send a thread description to the PDA browser. The recipient could then navigate the thread, clicking to open any contained messages, etc. This example assumes a fixed IP address that is available in some cases, but for others, an ICQ-type identification scheme could be used.

Another obvious preference is to be apprised of replies to one's own postings. The example below suggests how the convergence of mobile and speech generation technology such as that of Speechworks (http://www.speechworks.com) can extend the level of interaction of voice-only mobile phones:

"Whenever someone replies to any of my postings, then call my cell phone at (703) 412-6833 and read it to me."

Speech recognition could be applied to further enable such users to post by voice.

4. Conclusions

As seen in the examples above, 3G threaded discussions will be expected to deliver highly customizable service across the diverse array of connective devices found among a typical university-level class. Fortunately, the necessary technologies such as the Cisco CTE 1400 Series appliances are emerging and making it feasible to realize the vision. As a result, this form of m-Learning will prove even more effective than previously realized and new application opportunities will present.

5. References

[1] Alavi, M., "Computer-Mediated Collaborative Learning: An Empirical Evaluation", MIS Quarterly, June, 1994, pp. 150-174.

[2] Harasim, L., (ed), On-Line Education: Perspectives on a New Medium, New York: Praeger/Greenwood, 1990.

[3] Hiltz, S. R., "Collaborative Learning in Asynchronous Learning Networks: Building Learning Communities", Web 98 Symposium, Orlando, Florida, 1998.

[4] Hiltz, S.R., The Virtual Classroom: Learning without limits via computer networks, New Jersey: Ablex Publishing Corporation, 1994.

[5] Picciano, A. G., "Beyond Student Perceptions: Issues of Interaction, Presence, and Performance in an Online Course", Journal of Asynchronous Learning Networks, 6(1), 2002, pp. 21-40.

[6] Powell, W., "Anytime, Anywhere", Training and Development, 55(11), 2001, pp. 38-45.

[7] Sahai, A. and V. Machiraju, "Enabling of the Ubiquitous e-Service Vision on the Internet", e-Service Journal, 2001, 1(1), pp. 5-19.

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