Project Name: In[sid] Outside: Building on the Arch-App

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Year of Funding: 2013-2014

Submitted by: Catherine Dowling + Mimi Whalen

Project Abstract (max 200 words)
Your abstract of your findings should include enough detail so that rationale, methodology and outcomes are clear. Use plain language as this abstract will be posted on the LTO website.

The Arch-App was developed as a mobile learning tool in a partnership between Ryerson University’s Department of Architectural Science and the Ryerson University Library and Archives. It is a free interactive mobile app that uses geo-location data to help users identify and learn more about the architecture, design, and history of the city of Toronto. Our research expanded its usage into the School of Interior Design to engage a broader cross-section of undergraduate students. Focus was centred on its’ usefulness as a pedagogical tool for design history, theory, and technology classes. We measured its effectiveness in spurring student choice, flexibility, and critical synthesis of existing architecture and design paradigms using real-world, real-time data dissemination. Data was collected measuring the student research process including both positive and negative aspects. Results revealed the Arch-App’s strengths and weaknesses and indicated trends in undergraduate learning behaviours. Efficiency, accuracy, and depth of content were most appealing and led to enhanced participation, retention, and development of research skills. The Arch-App has demonstrated its value as an innovative m-learning tool enhancing pedagogy both inside and outside the classroom in the 21st century.

Summary of Work Accomplished (max 1500 words)
Describe the study rationale (including supportive literature), project methodology, outcomes and potential application of outcomes.

A significant element of m-learning skills relates to the idea of the democratization of knowledge and its promotion by students. The app is free – anyone with a smart device could in theory download it and browse its basic database features. Students and the public can supplement their learning about the history and culture of where they are studying, visiting, or living – which is a significant objective for building an inclusive urban fabric. Nedungadi and Raman’s (2012) study noted m-learning’s explosive popularity in India linked to a new accessibility for lower-income users who might not have the resources to access classroom and lab facilities.[10] Anytime, anywhere accessibility generates more time spent learning as well as life-long learning.[10][19] Cadavieco et al.’s (2012) m-learning review notes the European Educational Framework focus on training student-citizens who are able to interact flexibly and autonomously in society.[19] Successful app users are inspired not simply to explore, but also to potentially teach others and to design the next generation of m-learning environments. Respondents who were able to use the app and self-identified as technologically savvy had very particular suggestions about how to improve it ranging from interfaces with other social media platforms e.g. Facebook and Twitter to location of help menu and how to specifically tag content for indexing.

A trajectory of expansion for the Arch-App was promoted by Ryerson University as a showcase of campus technological innovation.[7] The Ryerson School of Interior Design (RSID) came on board in 2012 with research funding supplied to enhance the Arch-App’s reach and capabilities and test its applicability across university disciplines. RSID is a transdisciplinary department and the intention was to evaluate its relevance and address programming, editing, and template development. More robust content for interiors including contemporary, student-generated construction details, plans, sections, elevations, models, and photography was generated. This was to complement the archival
and course-specific texts and materials added from the architecture department’s history and studio stream offerings. Everything from concept sketches to structural diagrams and video interviews was added.[1] RSID students would be able to access a repository of information available on their smart devices relevant to their interests that would save them time while stimulating exploration and learning. Ryerson University’s mandate is to be a “city builder” with our downtown location and resources and the app was intended to feed examples into the curriculum from the city. This in turn would be used by students to enhance learning and create further content, enriching knowledge of Toronto’s built environment. A further goal was to have this “wiki” component create student researchers adding to a knowledge repository that would be permanent and used by future generations providing enduring documentation of Toronto’s architecture and design legacy.

In 2013, two design history and theory stream courses (IRH101: History of Design 1 and IRH201: History of Design 2) were required to use the Arch-App for their major term paper. Students were asked to select an influential interior created anywhere in the world since 1995 and analyze it from a variety of perspectives including: spatial organization and planning, materials and construction methods, furnishings and ornamentation, functions and signification, precedents and inspirations. No two students (sample size 99) were allowed to choose the same interior. Section G of the analysis was “links to design in Toronto” and it was compulsory to use (or attempt to use as we shall see) the app to find similarities based on the perspectives between an interior on the app and one chosen for the essay. In addition to being evaluated on their research gathered from the Arch-App applied to their interior created somewhere else in the world, students were required to complete a sheet about the pros and cons of the app’s usage in the research process. It should be noted that 13.1% of students could not use the app (for reasons to be addressed in section 3). These students still had their responses coded and tabulated if they were made in relation to the functioning of the app and its perceived advantages and shortcomings. In addition, non-users were given an equivalent methodology and process using the worldwide web and public transportation to locate potentially relevant interiors. This acted as a baseline comparator for the app’s performance versus the more passive on-line search approach.

Students were told they were beta testing the app and were intentionally not given specific instructions on how to locate the app for downloading – only the name was supplied. This allowed measurement of all aspects of its usage including ease of access and interconnectivity. Usage of the mapping tool and create tour features presented issues which were exacerbated by student expectations. As Hui et al. (2012) note in their overview, at a basic level the Arch-App is intended to allow users to look up an architectural project by its name, era, architect, or typology and then access associated design imagery, bibliography, text, and videos.[1] When this result was not easily achieved (if, at all) there was frustration as well as attention to recording the specific issues in the requisite evaluation process. Many out of town students were excited by the idea of exploring the city using their smartphones and tablets to customize their experience based on their preferences synchronized using geolocation and augmented reality. When desired features were inoperable, crashed, or were not compatible with their platform (Blackberry for instance) it led to mounting concern about submission deadlines and alternate processes to obtain a valid comparator. Thus the intended methodology not only required modification, but revealed a much more complex picture of the app’s advantages and shortcomings than initially expected.

While 100% of students in the design history quantitative analysis had access to a smart device and were required to use the Arch-App, not all students had a current enough operating system or compatibility.[2][13] Many of the technical issues with the first iteration have been corrected with the 2.0 version launched in December, 2013. There is now a search engine by keywords, more compatibility with different platforms, a “go back” command, and enhanced mapping, augmented reality, and tour features. While assumptions were made about how technologically savvy Ryerson students were, with 13.1% of students unable to use the app at all, accessibility cannot be automatically assumed with the 2.0 version. This is supported by Bennett et al.(2012) who note in their meta-analysis of case studies that students’ limited prior experience with web 2.0 technologies needs to be accounted for when assigning tasks for credit.[14] Lynch et al.’s (2010) study also addressed these issues noting that: “...if the information is critical to the students well-being or affect their time use, they want it pushed to their mobile phones – as mandatory and automatic, not by subscription.[15] Anything students need to complete an assignment in a timely fashion is expected to be operable.
In the fall of 2013, 96 students (IRT201: Design Technology 2) were required to use the Arch-App to develop content that showcased specific Ryerson campus buildings. This included creating new entries for those not included in the App’s first iteration. Each student was required to site visit, measure, digitally photograph, extrapolate (through lecture and course text reference), and hand draw five full-scale construction details of a campus interior from a course supplied list. The assignment, “Weekly Details”, was intended to develop student practice in generating technically-accurate interior elements from existing buildings including walls, ceilings, floors, and custom-fabricated assemblies. In total, 27 existing interiors of assigned campus buildings were documented with each student required to submit both a hard copy and a digital copy for course evaluation and vetting by research assistants and faculty. Students were told to look at existing entries on the Arch-App to create a baseline understanding of minimum standards for potential inclusion of their work. They were also to assess which buildings on campus were lacking visual and written data for entries. This allowed students to actively choose what specifics they would focus on to enhance the app based on personal preference. Student decisions would also drive suggestions for future modifications to the entry template to include new headings such as interior materials.

The screening process for potential inclusion in the Arch-App involved specific parameters to create a refined pool of imagery. Technical factors influencing selection included variations in line weights, image clarity and resolution, accuracy of detail, cleanliness and legibility of drawing, and type of paper used (which affects scanning properties). Content factors influencing selection included details that were easily identifiable without need for description, interesting and unique details of buildings, imagery that conveyed context and a sense of scale and proportions, and images presenting combinations of materials with their applications and uses in relation to one another. Research assistants carefully balanced the technical and content factors choosing only the most professional and accurate imagery for uploading. The final weeks of entering archival and edited student data enabled information to be digitally accessible by March, 2014 and at the request of the Library team, RSID renamed the Arch-App to ARC-App to reflect a broader inclusivity for future Ryerson initiatives.

**Evaluation of Project’s Success (max 600 words)**

*Explain how you know that the project was successful (Include evidence of rigorous evaluation.)*

Student attitudes towards the value of the app were directly impacted by its ease of use. This corresponds with Sarrab et al.’s (2013) examination of m-learning case studies where perceived usefulness, ease of use, and facilitating conditions (connection speed, software support) significantly affected students’ intentions to adopt m-learning.[9] M-learning with enhanced interactive features also requires reliable wireless connections, an easy to use interface, and cross-platform compatibility.[9] In addition, recent generation 4G technology is preferred for video and image transmission, faster speeds and wider network spectrum.[16] The AR feature using LAYAR was not operable for most students and thus the truly interactive site-specific layering of virtual information was not readily available. Current research suggests that many students would appreciate this with Abachi and Muhammad’s (2014) surveys revealing an 80 – 90% willingness amongst undergraduate and graduate students to use it as part of coursework.[16] In addition, their data confirmed that uploaded interviews and guest lectures are also highly desirable additional layers for m-learning - unfortunately not readily accessible by RSID students.[16] Small screen sizes also impede the attractiveness of AR and viewing rich content; limited readability and interactivity combined with features crashing or failing to load need to be addressed.[10][19] Nedungadi and Raman’s (2012) study noted larger screen sizes (like those on tablets and personal computers) were desired to fully utilize software and respond to pedagogy.[10]

Entries to the Arch-App are currently vetted by research assistants and/or faculty. This has resulted in an information backlog but is also one of the critical components that separates the app from larger non-peer reviewed web resources. If this were to change, students would not be as inclined to trust the app as a “scholarly” resource for their research. It would, in effect, become no different than how they treat Wikipedia. In the survey, students commented on the factual errors they saw on the app – because they were looking for accuracy and were surprised when they did not find it. In several instances, students were employees at a location featured on the app and felt obliged to correct specific inaccuracies. This is indeed a valuable asset – student engagement and interest in
ensuring the app’s credibility as scholarly. Choosing only the most professional and accurate images for uploading reinforced this. The idea that top student content is rewarded with inclusion in a reputable university database publicly available increases a sense of pride and ownership of learning objectives. This information was shared with RU library App team to enable ongoing and future revisions.

M-learning is using a combination of different media e.g. texting, web-browsing, music, videos, podcasts, cameras, GPS, email, games, and the thousands of apps available for download to smart devices.[1][9] Assumptions about how the Arch-App was being used as an m-learning platform were quickly modified by the obviously home-based usage for certain students. Students choosing to use the app at home did so not simply due to inclement weather and tight deadlines, but because so few entries deemed to have valid comparators were complete. For these students, the Arch-App was viewed as supplementary to traditional sources of information (on-line, libraries etc.). If all entries were completed and all features were functioning, students would have been more likely to visit the sites in question in person. Once more entries are comprehensive and technological glitches are overcome, students will perceive the app as more valuable and practical for on-site visits using the mapping, tours, and AR features.

Transferables (max 500 words)
List and describe knowledge gained in this project and how that knowledge could benefit faculty members in the Ryerson community

The Arch-App is a contribution to the emphasis of ICT (information communication technology) on building relevant human resources for a knowledge-based, global economic structure. Ryerson’s diverse student population adapting and developing m-learning may take their knowledge to other regions of the world across their professional and personal lives – in particular, to regions with rapidly developing economies. For instance, in the Middle East, e-learning projects had a compound average growth rate of 32% by 2008.[9] E-learning and m-learning increase social interaction and capital in addition to expanding when and what can be learned, creating a ubiquitous learning environment. Bennett et al. (2012) describe web 2.0 skills as “a required competence for the contemporary world.”[14] M-learning leads to increased student inspiration and productivity – anytime and anywhere access to learning resources with personalization (for AR, mapping, tours) facilitating pedagogical goals.[9][16] Wu et al. (2012) in their review of trends in mobile learning note the exponential increase in m-learning as revealed in the increase in publications evaluating its’ design and effects having 86% positive research outcomes.[18]

Ryerson University prides itself on the diversity of its student population – it is one of its greatest assets.[17] In the design history and theory stream, students were diverse in their chosen essay topics including 31 different countries and 15 different building types. With 39.4% choosing to openly criticize the lack of diversity in app entries, and, in some cases, suggesting biases in the entry selection process, attention needs to be focused in the 2.0 version on rounding out perceived lacunae. As more content featuring contemporary as well as historic interiors is added with a greater diversity of building types reflected, this issue should be mitigated. This may result in enhanced interest, application of knowledge (due to increased perception of relevancy) and familiarity with Toronto’s built environment. This will also change perceptions of value. Bennett et al.’s (2012) meta-analysis determined that even when students enjoyed creating content for a web-based tool, if it did not translate to better assessments on course work or valuable feedback from an instructor, it was limited in value.[14] If assignments linked to the Arch-App result in higher marks from greater engagement and deeper learning, the pedagogical objectives of the tool will be achieved.

Future research addressing student adaptation and usage of the App needs to measure and track perceptions of interest, motivation, accessibility, perceived value, and learning enhancement. Completion and diversification of app entries should be prioritized in addition to overcoming accessibility and compatibility concerns. This will allow comparison of the latest iteration, ARC-App 2.0, with its initial beta testing and results. As the app’s usage spreads into other departments and the greater Toronto community, it’s value as a pedagogical tool for both students and the public will be refined and enhanced ensuring its’ significance for future generations. The role of m-learning in 21st century pedagogy continues to expand and the ARC-App is a valuable contribution to this trajectory.
Media or Publication (max 500 words)
List any media attention your project has received internally from Ryerson or externally. List any publications or conferences you have attended where data from this project was presented. Confirm that you acknowledged or will acknowledge the grant’s contribution to your work in media, publication or conference presentations.

Conference presentations confirmed and LTEF grant/support acknowledged:

  INTED2014 Conference, March 9/10, 2014, Valencia, Spain – this conference presentation had a digital proceedings/publication that is currently being integrated into the Open Access Repository by Ryerson library staff

  Ryerson LTO Conference May 22, 2014

March meeting with Library App team, architecture faculty and Nancy Walton for Vice-Provost e-learning proposal – update regarding RSID involvement and desired continued involvement with the project.

Future conference presentations:

  IDEC (Interior Design Educators Council) national conference abstract submission this summer for presentation spring 2015, LTEF grant/support to be acknowledged.

Financial Summary

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<tr>
<th>Budget Item (list all items on original budget that were funded)</th>
<th>Amount budgeted</th>
<th>Amount expended</th>
<th>Balance remaining for this item (if any)</th>
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<td>two RSID fourth year research assistants</td>
<td>$9,000.00</td>
<td>unknown*</td>
<td>unknown*</td>
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Total balance remaining (if any):

*The full amount was not used but am not sure what the final amount expended was.
Bibliography from research/published paper as referenced above:


[4] Ryerson’s enrollment in 2012 according to CUDO (Common University Data Ontario) was 29,210 with only 850 residence beds for living on campus. See: http://www.ryerson.ca/about/data/e-student_life/


[11] The four entries were: The Art Gallery of Ontario (AGO) (21.43%), Umbra Store (9.18%), Euclid Avenue House (7.14%), and the Royal Ontario Museum (ROM) (5.10%).

[12] The 31 countries were: Japan, France, Australia, Canada, Lebanon, Germany, China, Chile, Israel, USA, England, Spain, Rwanda, Hungary, Sweden, India, Italy, Thailand, The Netherlands, UAE, Switzerland, South Korea, Denmark, Mexico, Finland, Ukraine, Canary Islands, Singapore, Austria, Norway, New Zealand.

[13] This is an improvement from 2009 when only 97% of students surveyed at Ryerson University had access to mobile devices. See reference [1].


[17] Ryerson has students attending from 146 countries. See: http://www.ryerson.ca/news/media/quickfacts/
