What Technology Tools Promote such Extreme Learning?: Analysis of Technologies Used in Extreme Learning Websites

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Abstract

Extreme learning explores how people learn or teach with technology in unusual or unique ways outside traditional educational settings. In an age of open education where anyone can learn anything from anyone else at any time, Internet technology has greatly contributed to extreme learning. But research on how Web-based extreme learning has improved human life and promoted human learning is relatively scant. This paper is a report on the findings of a study based on 135 websites collected by research group members and the ratings of these websites based on eight criteria. Twenty high ranking websites were analyzed to see what and how technology tools are employed to the improvement of extreme learning.

Introduction

Extreme learning is related to informal and non-traditional learning. It explores how people learn or teach with technology in unusual or unique ways outside of traditional educational settings. Extreme learning can involve blogging while climbing Mount Everest or reading the blogs of that person or subscribing to Twitter feeds of an adventurer exploring Mayan ruins. It might also entail children from South Africa being mentored by adults from North America using a Webcam or signing up to learn Mandarin or Hindi using a language learning service like Livemocha or Mixxer. So much is possible that was not dreamed of a mere decade ago. Suffice to say, our extreme learning research entails activities that do not happen in traditional schools or educational experiences. It can be relatively passive such as watching an online video in TED, TVLesson, or BigThink or highly engaging an active such as writing a wikibook on Ukrainian dancing or how to run a marathon. Through extreme learning Web resources, there is hope for those who might have normally have access to education. In addition, those with extensive education can enhance it and find new interests, hobbies, and learning passions. Some might be retired and searching for a way to contribute to the learning of others. And then there are individuals who are just exploring the Web and finding new passions, insights, and people with similar interests. Today, there is much educational hope and opportunity on the Web for the very young to those in nursing homes. There are open educational resources that one can browse or contribute to (Iiyoshi & Kumar, 2008) as well as courses that are made open to the world to peer in on in different forms of open teaching.

We are living in an age of open education where anyone can now learn anything from anyone else at any time (Bonk, 2009). A sense of empowerment could be equipped when technology is thoughtfully

employed. Such empowerment can offer purpose and meaning in a person's life. Each day, tens of millions of people have their lives impacted by their casual online learning pursuits. They make a choice to explore a Web resource, engage in a freely offered online learning lesson, or discuss social and cultural issues with others in an online podcast show, chat, or online talk show. Attitudes, perspectives, and skills are change as this occurs. Despite the many life altering possibilities, minimal research exists on extreme teaching and learning resources, tools, and activities at this time. As such, there is a need to capture snapshots as well as longer views of human growth resulting from extreme teaching and learning situations.

Internet technology changes the way people learn as well as the learning environments for that learning. Individuals can enter and exit a learning resource at will. They might casually browse it in the morning and then come back two days later for a more thorough analysis of the content. Personal control and a sense of empowerment are keys to learner motivation. Zaidel and Lou (2010) indicated that personalizing the learning process using the Internet can enhance student performance of academic tasks. Other researchers (Kartal & Uzun, 2010; Kern & Warschauer, 2000; Kong, 2009) contend that Web resources and services provide opportunities to vastly improve the learning experience. They argue that presenting learning content according to a person's needs and preferences profoundly impacts learning targets. And today, there are many ways to personalize and individualize learning on a moment-to-moment basis.

Research in extreme learning has begun to receive attention for its potential in general but investigation of the tools used on extreme learning Websites is relatively unexplored. Therefore, the purpose of this study is to evaluate the specific tools utilized in the top 20 extreme learning Websites.

Methodology

In this section, we (1) briefly describe how we evaluated the websites, (2) select three (or so) top-scored websites in each education category, and (3) explain the process of collecting and analyzing the tools used in the websites.

We developed the list of extreme learning websites in two stages: (1) a team of a dozen researchers located and shared potential extreme learning sites; and (2) a subgroup of four researchers rated 135 of these websites using an eight-part coding scheme. This coding scheme was developed by the entire research team based on a set of technology features and instructional resource characteristics found in the research literature (See Appendix A).

Members used different methods for locating extreme learning sites, including personal knowledge, conducting Web searches, scanning books, blog posts, and technical reports, and soliciting expert recommendations. The resulting list of resources was categorized into five areas: (1) language learning, (2) outdoor/adventure learning, (3) social change/global learning, (4) virtual education, and (5) other/miscellaneous.

After much fine-tuning, the final version of the evaluation criteria included eight areas: (1) content richness, (2) the functionality of the technology, (3) the extent of technology integration, (4) the novelty of the technology, (5) the uniqueness of the learning environment/learning, (6) the potential for learning, (7) the potential for being life changing, and (8) the scalability of the audience. Each Website was rated in multiple phases based on the eight criteria using a 5-point Likert scale (1 is low; 5 is high). Given the use of four raters, Cronbach's alpha, was performed to determine internal consistency across the four raters. The alpha coefficient for the four items was .744, suggesting that there was an acceptable level of internal consistency in the analyses conducted by these raters.

Average ratings were calculated and the Websites that scored relatively high (above 3.5) were chosen for further review. Technological features of these sites were analyzed to address what and how specific tools are utilized. Researchers identified technology tools used in the top 20 web site to categorize into three different types including content delivery tools, interactive tools, and activity tools. Interactive tools are sub-divided into asynchronous and synchronous tools.

Findings

In this section, characteristics of technology tools are described with specific examples in each education category. Furthermore, summarized tables are included with three types of feature categories explaining the nature of the tools and education categories.

1. Language Learning

In the language learning category, the six highly rated learning Websites were: Live Mocha, BBC Learning English, Kan Talk, Palabea, Chinese Pod, and Nciku. When we took a closer look at these Websites, we found that the use of technology contributed greatly to their high ratings. Due to the communicative nature of language learning, these sites share some common characteristics that enable language learners to improve their communicative skills in the target language.

As shown in Table 1, the choice of various technological support tools is offered at these sites so that learners have many choices in terms of way of learning. Since language learning involves the improvement of skills in four aspects--listening, speaking, reading and writing--these choices of technological tools enable learners to sharpen one or more skill areas. It also means learners of different ages and different learning needs can find some technological assistance facilitating their learning. All six language websites offer text, video, and audio tools so that learners will combine sight, hearing, speech, and touch in their language learning. Live Mocha and nciku also offer games so that learners can challenge themselves, enjoy themselves, and improve their language learning at the same time.

Furthermore, learning community and socializing tools are embedded so that learners can share their culture as well as their learning experiences, while helping each other. Online communities are built at all of these six sites, which offer community building and socializing tools such as blogging tools, Facebook, etc. They also offer a group search function so that learners can choose to join the groups and share their knowledge with other group members, which greatly engages students in the learning process. For instance, Nciku offers a share function and a blog function where language learners can share what they have learned and thought of.

In addition, chatting functions or instant message tools are embedded so that learners can communicate with native speakers and engage in language exchange programs. Since language is communicative in nature, various functions and tools are embedded in these websites to help in the exchange between language buddies. Palabea embeds a chatting function which includes video chatting and text chatting. Kan Talk embeds Skype, which enables learners to employ voice chat and send messages to each other. Live Mocha offers a text chatting tool that enables learners to send and receive messages with online friends and to engage in cultural exchange.

Table 1: Tools used in Language Learning Websites

Websites	Contents Delivery Tool	Interactive Tool		Activity Tool
		Synchronous	Asynchronous	
Livemocha[1]	▪ Video ▪ Flashcard,	-	▪ Instant message	▪ Game ▪ Tutoring for others ▪ Culture sharing
BBC Learning English[2]	▪ Video ▪ Audio ▪ Podcast	-	▪ Blog ▪ Facebook Twitter ▪ Message Board	▪ Quiz ▪ Game
Chinese Pod[3]	▪ Lesson PDF/Text ▪ Audio ▪ Video	-	▪ Online post ▪ Blog	-
Palabea[4]	▪ Video ▪ Text ▪ Podcast	▪ Voice/video chat	▪ Text chat ▪ Forum	▪ Virtual classroom
Kan Talk[5]	▪ Video ▪ Recording	▪ Skype	▪ Instant message	-

[1] Livemocha (http://www.livemocha.com)
[2] BBC Learning English (http://www.bbc.co.uk/worldservice/learningenglish)
[3] Chinese Pod (http://chinesepod.com)
[4] Palabea (http://www.palabea.net)
[5] Kan Talk (http://www.kantalk.com)

Nciku[6]	▪ Audio ▪ Text ▪ Electronic dictionary ▪ Mobile application	-	▪ Facebook ▪ Twitter ▪ Blog ▪ Instant message	-

2. Outdoor and Adventure Learning

Adventure learning, a form of non-traditional learning, is defined as "an approach to the design of online and hybrid education that provides students with opportunities to explore real-world issues through authentic learning experiences within collaborative learning environments" (Veletsianos & Klanthous, 2009, p. 85). Proper utilization of media tools is the key to fostering authentic learning experiences within the hybrid online environment. More specifically, each top rated outdoor/adventure learning website contains high quality photos and short streamed video clips that are generally ordered in a series as the main vehicle to deliver contents (see Table 2). Written-typed discussion forums are also widely used by the adventure learning participants. In addition, social networking services can enhance the engagement.

Research has indicated that learners are more likely to connect their new learning to representations of a situation as it is stored in memory. For maximum efficacy, high-quality visuals are essential elements in providing students with opportunities to explore real-world issues through authentic learning experiences within collaborative learning environments. As indicated by the ratings, the highest rated criterion of adventure learning Web resources is the functionality of the technology. In other words, the tools integrated in the Websites are appropriately selected to meet the intended purposes of adventure learning. Using video materials for educational purposes holds much promise. Kozma (1994) stated that video contains a great deal of detail and crucial information. Considering that adventure learning is rooted in the experiential learning theory, it seems reasonable to use videos and photos as the main vehicles for achieving the intended educational purposes.

Table 2: Tools used in Outdoor and Adventure Learning Websites

Websites	**Contents Delivery Tool**	**Interactive Tool**		**Activity Tool**
		Synchronous	**Asynchronous**	
Earthducation[7]	▪ Video journals ▪ Picture gallery ▪ Online Archive ▪ Google earth	-	▪ Facebook ▪ Flicker ▪ Video Narrative Tool	-
Jon Bowermaster[8]	▪ Blog ▪ Video ▪ RSS Newsfeed ▪ E-books ▪ Photo gallery	-	▪ Facebook ▪ Twitter ▪ Youtube	-
Around the World 4*4 Expedition[9]	▪ Journal ▪ Photos ▪ Videos ▪ Google map	-	▪ Facebook ▪ Twitter ▪ RSS	-
Polar Husky[10]	▪ Audio documentary ▪ Video documentary ▪ Movies ▪ Journals ▪ Tutorials	▪ Weekly chat	▪ Q&A ▪ Message ▪ Forum	▪ Weekly quiz
impossible2possible[11]	▪ Newsletter	-	▪ Facebook	-

[6] nciku (http://www.nciku.com)
[7] Earthducation (http://lt.umn.edu/earthducation)
[8] Jon Bowermaster (http://www.jonbowermaster.com)
[9] Around the World 4*4 Expedition (http://www.theworldbyroad.com)
[10] Polar Husky (http://www.polarhusky.com)
[11] impossible2possible (http://impossible2possible.com)

	▪ Video ▪ Photo ▪ Electronic Document		▪ Twitter ▪ Expedition live tracker (GPS)	
Penguin Science[12]	▪ Electronic Document ▪ Videos ▪ Photos	-	-	-
Explore Arctic[13]	▪ Videos ▪ Photos ▪ Electronic Document	-	▪ Forum ▪ RSS ▪ Facebook ▪ Twitter	-

3. Social Change and Global Learning

Social change and global learning deal with inspirational and motivational human learning stories as well as human development rather than directly providing educational materials. In comparison with other categories, a small number of websites were collected in social change and global learning. As a result of the low rating, only one social change and global learning Website was selected here.

Link TV provides a unique perspective on international news, current events, and diverse cultures, presenting issues not often covered in the U.S. media. As Link TV broadcasts on a wide range of topics, many different kinds of technologies are used. Primary tools are streamed video clips with a news description as well as embedded Twitter feeds for viewer engagement. Podcasts, RSS Newsfeeds, and e-newsletters are also used to send up-to-date news to viewers. To share world culture, Link TV also runs a music blog where international and local concerts, festivals, and interviews with musicians are updated.

Table 3: Tools used in Social Change and Global Learning Websites

Websites	Contents Delivery Tool	Interactive Tool		Activity Tool
		Synchronous	Asynchronous	
Link TV[14]	▪ Music Blog ▪ RSS ▪ E-newsletter ▪ Video journals ▪ Podcasts	▪ Weekly live chat	▪ Twitter ▪ Online Forum	-

4. Virtual Education

Virtual education refers to instruction in a learning environment where the teacher and student are separated by time or space, or both, and the teacher provides course content through the use of methods such as course management applications, multimedia resources, the Internet, and videoconferencing. Students receive the content and communicate with the teacher via the same technologies. Given the main purpose of virtual education is to deliver online educational materials in an effective way, it is not too surprising that virtual education was the highest rated in terms of content richness and the most scalable. Some websites such as MIT OCW and the Khan Academy offer very high quality lectures and extensive content. Both cover a vast range of subjects in extensive detail.

To effectively disseminate tons of educational materials to the public via the Internet, the appropriate selection of technology and its proper usage seems vital and inevitable. In the top-rated virtual education websites, the most widely used technologies are series of streamed video clips organized by subject and online archives where learners can download lecture materials. As for self-assessment, some virtual education websites provide Web-based practice tools which can be stored to check academic progress. Similar to adventure learning sites, all virtual education Websites are associated with social

[12] Penguin Science (http://www.penguinscience.com)
[13] Explore Arctic (http://www.explore.org)
[14] Link TV (http://www.linktv.org)

networking services as a marketing strategy and as a better engagement tool among participants. As an interaction tool, many virtual education websites have online forums and chatting rooms.

Table 4: Tools used in Virtual Education Websites

Websites	Contents Delivery Tool	Interactive Tool		Activity Tool
		Synchronous	Asynchronous	
Khan Academy[15]	▪ Videos lecture	-	▪ Online Forum	▪ Online Exercise Tool ▪ Progress Showing Tool
MIT Open Courseware[16]	▪ Online Textbooks ▪ Image Galleries ▪ Video/Audio Lecture ▪ Electronic Document ▪ Online Archive	▪ Chat room	▪ Online Forum	-
MIT OCW for High School[17]	▪ Online Textbooks ▪ Image Galleries ▪ Video/Audio Lecture ▪ Electronic Document ▪ Online Archive	▪ Chat room	▪ Online Forum	-
Open Yale Courses[18]	▪ Video/Audio Lecture ▪ Electronic Document	-	-	-

5. Other/miscellaneous

Even though Ed Tech talk and Explo.tv are not categorized, the technological tools that contribute to their high ratings in the list of websites are still worth mentioning. Both sites score very high in the functionality of the technology. One common feature of these two websites is the use of video and webcasts to deliver content. This means using videos might be a very good way to engage learners and improve learning in the self-directed learning environment.

Table 5: Tools used in Other/miscellaneous Websites

Websites	Contents Delivery Tool	Interactive Tool		Activity Tool
		Synchronous	Asynchronous	
Ed Tech talk[19]	▪ Audio ▪ Video ▪ Text ▪ Webcast	▪ Chat room	-	▪ Chat room
Explo.tv [20]	▪ Video ▪ Webcast ▪ Slideshow ▪ Podcast	-	-	-

Conclusions

Many interesting characteristics of integrated tools in extreme learning websites emerged from our analyses. Overall, specific technology tools are identified in each education category. Discussions on how

[15] Khan Academy (http://www.khanacademy.org)
[16] MIT Open Courseware (http://ocw.mit.edu)
[17] MIT OCW for High School (http://ocw.mit.edu/high-school)
[18] Open Yale Courses (http://open.yale.edu)
[19] Ed Tech talk (http://edtechtalk.com)
[20] Explo.tv (www.exploratorium.edu)

to utilize those tools are also stated. Findings indicate that technology tools were chosen to accomplish the intended purposes of each website. Selection of tools is dependent on the natures of education category. As virtual education focuses on a way of effective transfer of educational materials, it primarily utilizes content delivery tools. Similarly, it is important to offer a highly interactive resource for language education with audio/video forums as well as provide an authentic learning environment in outdoor and adventure learning with visuals for effective learning. However, given that this research is still in the beginning stages, further data collection and investigation is needed related to how technology tools influence the design of extreme learning environments. Once better understands, any and examples can be offered to those designing or coordinating similar sites.

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Appendix A. Extreme Learning Web Site Coding Scheme

No	Criteria	Definition	1 (Low)	2	3 (Medium)	4	5 (High)
1	**Content Richness**	This criterion deals with how much information the Website, resource, or project contains on the topic chosen, how adequately it fulfills the purpose of learning, and whether the information is credible and up-to-date or not.	The Website, resource, or project doesn't contain much information on the topic chosen, and doesn't adequately fulfill the purpose of learning. The information is not credible or is out-of-date. There are few resources providing access to learning content; it may appeal to different learning preferences or styles.	-	The Website, resource, or project contains less information on the topic chosen, and fulfills the purpose of learning to some extent. The information is somewhat credible or is up-to-date. There are some resources providing access to learning content; it may appeal to different learning preferences or styles.	-	The Website, resource, or project contains much information on the topic chosen, and adequately fulfills the purpose of learning. The information is credible and up-to-date. There are a wide range of resources providing access to learning content; it may appeal to different learning preferences or styles.
2	**Functionality of Technology**	This criterion deals with the ease of access, navigation, and use of the Website, resource, or project and whether it contains effective and appropriately employed technology to serve the stated learning purpose.	The Website, resource, or project is difficult to access, navigate, and use and contains ineffective technology for the stated learning purposes of potential users.	-	The Website, resource, or project is relatively intuitive or easy to access, navigate, and use and contains somewhat effective and appropriately employed technology to serve the stated learning purposes of potential users.	-	The Website, resource, or project is extremely intuitive and easy to access, navigate, and use and contains highly effective and appropriately employed technology to serve the stated learning purposes of potential users.
3	**Extent of Technology Integration**	This criterion deals with the range, amount, and types of technologies employed including issues of interaction, collaboration, and information collection, contribution, and community through such technology.	The Website, resource, or project contains few technologies for learning. Technology tools are not interactive, collaborative, or participatory and do not promote communication or sense of community. User contribution is limited or nonexistent.	-	The Website, resource, or project contains some range of technologies for learning. Technology tools are moderately interactive and collaborative and might enhance information exchange or user communication and contribution.	-	The Website, resource, or project contains a wide range and amount of technologies for learning. Technology tools are highly interactive and collaborative and can greatly promote information collection and dissemination as well as user communication and contribution.
4	**Novelty of Technology (Coolness Factor #1)**	This criterion deals with whether the Website, resource, or project contains emerging, unusual, or novel technologies.	There is no experimentation with emerging, unusual, or novel technologies for learning and the technologies which are used are out-of-date.	-	There is some experimentation with emerging, unusual, or novel technologies for learning which might motivate or engage potential users/learners.	-	There is extensive experimentation with emerging, unusual, or novel technologies for learning; some of which is quite exciting, motivating, or appealing for potential users/learners.
5	**Uniqueness of Learning Environment / Learning (Coolness Factor #2)**	The Website, resource, or project serves the purpose of learning in a non-traditional, unique, or extreme learning environment, which is highly different from traditional classroom settings.	The Website, resource, or project is just a replication of formal or traditional school-based learning. The learning is essentially what the user or learner might experience in a traditional teaching or training situations. The Website, resource, or project might be rather plain or unappealing to the potential learner or user; it is one of dozens of such sites.	-	The Website, resource, or project is somewhat unique or different from traditional learning. There are learning opportunities that are somewhat novel or hard to find in formal or traditional settings. The Website, resource, or project makes an attempt to connect people to each other as well as to novel resources and activities and current information not easily found in books	-	The Website, resource, or project is unique or different. There are learning opportunities that are novel or hard to find in formal or traditional settings. The Website, resource, or project connects people to each other as well as to novel resources and activities and current information is not easily found in books or other traditional learning resources. There

					or other traditional learning resources. There is also some room for creative expression of the users.		is also extensive room for creative expression of the users.
6	**Potential for Learning**	This criterion deals with whether the Website, resource, or project enables and provides learning activities or learning opportunities for the target audience to achieve the intended learning goals. There might be many markers, targets, or goals for such learning as well as celebration of those who have completed one or more learning-related units, activities, or segments. Such markers might come in the forms of self-tests, discussions, reviews, interactions, etc. or various rich media resources. The paths for learning are varied and extensive.	The Website, resource, or project enables and provides few learning activities or opportunities for the target audience to achieve the intended learning goals. There are extremely limited markers, targets, or goals for such learning and limited acknowledgment related to those who have completed one or more learning-related units, activities, or segments (i.e., self-tests, discussions, reviews, interactions, etc. or various rich media resources). The paths for each learner may be not unique. There may be few ways to socially network or collaborate with others at the Website, resource, or project.	-	The Website, resource, or project enables and provides some learning activities or learning opportunities for target audience to achieve some intended learning goals. There might be some markers, targets, or goals for such learning as well as celebration of those who have completed one or more learning-related units, activities, or segments (i.e., self-tests, discussions, reviews, interactions, etc. or various rich media resources). The paths for each learner may be somewhat unique. There may also be some ways to socially network or collaborate with others at the Website, resource, or project.	-	The Website, resource, or project enables and provides the potential for learning activities or learning opportunities for the target audience to achieve most or all of the intended learning goals. There might be markers, targets, or goals for such learning as well as celebration of those who have completed one or more learning-related units, activities, or segments (i.e., self-tests, discussions, reviews, interactions, etc. or various rich media resources). The paths for each learner may be highly unique. There may also be ways to socially network or collaborate with others at the Website, resource, or project.
7	**Potential for Life Changing**	This criterion deals with whether the Website, resource, or project influences or improves the quality of life and extends or changes the perspective of the world for the intended audience. As part of this, there is potential for individuals to experience life changing or empowerment moments from the use of the Website, resource, or project.	The Website, resource, or project does not offer much in the way of improving or influencing the quality of life or the perspective of the world for the intended audience. The impact is quite narrow or limited. Users might not gain anything beyond basic skills.	-	The Website, resource, or project somewhat influences or improves the quality of life and the perspective of the world for intended audience. People are somewhat empowered to learn in ways that change their lives or broaden their outlook, perspectives, or knowledge and competencies. They can connect to other people or to knowledge and information in some ways that they might not have felt or experienced previously.	-	The Website, resource, or project significantly influences or improves the quality of life and extends or changes the perspective of the world for the intended audience. People are empowered to learn in ways that change their lives or broaden their outlook, perspectives, or knowledge and competencies. They can connect to other people or to knowledge and information in many ways previously unseen or seldom experienced.
8	**Scalability of Audience**	This criterion deals with the potential impact of the Website, resource, or project including the possibility to broaden the size and scope of its potential intended audience.	The Website, resource, or project has a narrow focus or does not have wide appeal or potential impact. The intended or actual audience is quite limited.	-	The Website, resource, or project has the potential to impact many people or a somewhat wide audience. It might have relevance to several different audiences or types of users.	-	The Website, resource, or project has high possibility to impact a broad audience or large scale and scope from one or more educational sectors (e.g., K-12, higher education, corporate, government, non-profit, or informal).

Appendix B. Compare to ‘average’ and ‘average for technology’ in Extreme Learning Websites

Categories	Websites	Average	Average of technology criteria[21]
Language Learning	Livemocha	4.4	4.4
	BBC Learning English	4.0	4.0
	Chinese Pod	3.8	4.3
	Palabea	3.7	3.8
	Kan Talk	3.6	3.6
	nciku	3.5	3.5
Outdoor / Adventure learning	Earthducation	4.0	4.0
	Jon Bowermaster	3.9	4.3
	Around the World 4*4 Expedition	3.6	3.4
	Polar Husky	3.6	3.6
	impossible2possible	3.6	3.2
	Penguin Science	3.5	3.2
	Explore Arctic	3.5	3.2
Social Change / Global Learning	Link TV	3.7	3.8
Virtual Education	Khan Academy	4.1	4.2
	MIT Open Courseware	3.8	3.4
	MIT OCW for High School	3.7	3.4
	Open Yale Courses	3.5	3.4
Other/Misc.	Ed Tech talk	4.0	4.0
	Explo.tv	3.8	3.5

[21] The average of technology-related criteria out of eight criteria for extreme learning websites evaluation that are #2.the functionality of the technology, #3. the extent of technology integration and #4. the novelty of the technology