eMOTE: electronic Mutual Online Teaching Environment

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ABSTRACT

Given the current trajectory of hardware and systems infrastructure that make up the Internet, the Web is truly becoming a ubiquitous presence in our daily lives. Bottlenecks will continue to be broken, and broadband will be easily taken for granted in even the most remote corners of the planet. The only remaining barrier is our ability to create software that can truly be *soft*. That is, malleable in the hands of the users, to create personalized virtual environments that seamlessly mesh with their real world.

Our belief is that the future Web will be a key source of education—not the *ivory tower* kind, but the *grass roots* kind. The kind of education that can be intuitively customized to the end-user in a way that is sensitive and consistent with learning styles and cultural significance. This paper overviews the current trajectory of Web evolution in terms of human-centric factors, in particular, those that are conducive to diverse educational environments. Based on this trajectory, we foresee a merger of two key elements in the future Web: (1) trust relationships as they are emerging in social networking and, (2) immersive online teaching environments. We call this merger *eMOTE* (electronic Mutual Online Teaching Environment), which we believe will be able to capture and communicate the one thing the Web has yet to accurately express—subtle emotional feedback.

General Terms

Social Networking, Online Teaching, Distance Education

1. INTRODUCTION

The future of the Web may indeed be an immersive 3D environment such as that depicted by systems like Croquet [1]. Earlier this year, the Boston Media-Grid Summit announced that the Immersive Education Initiative has selected Croquet as one of three official "next generation" immersive education platforms [2]. But let's face it—surfing is not what it used to be—the web is more like a tsunami everyday, and we just might be on a trajectory for a perfect (data) storm.

Despite how good Google is getting at detecting where we are by virtue of our IP addresses, and what we mean when we attempt to do an advanced search, there will undoubtedly be a growing need to accommodate more information with richer sets of priorities/perspectives. In our opinion, from a technical standpoint there is no question the Web can continue to scale to include more information, as we can arguably run the whole thing on one computer as it is now [3], but it will require a much more sophisticated set of surfing instruments than we currently have. Most importantly however, we hope this is not the only dimension in which the Web grows, as we would like to see it become an educational tool that supports mutual learning in a more human-centric way than the "one-size-fits-all" education systems we currently employ. We believe the Web holds this potential, to support a truly personalized yet global education system, through the merger of emerging trends in both social networks and eLearning environments.

2. CURRENT TRAGECTORY

Here we consider the major trends in evolution associated with social networking and eLearning. We believe these trends reflect an increased demand for human-centric support, though the requirements for this are subtle and still evolving. Though there are many applications to consider, we focus mainly on key features of just a few well known representatives such as FaceBook [4], YouTube [5] and SecondLife [6], and Open Course Ware from MIT [7].

2.1 Social Networking: Trends within Trends

FaceBook has been an incredible social phenomenon that has served not only to (re)connect people, but identify connections that really matter within organizations, as opposed to political infrastructure [8]. Through an intuitive point and click environment, a user's experience is controlled and guided, and the population reflects many newcomers to technology who reach levels of addiction in very little time. It will be interesting to gauge if a massive influx of application spam will arguably deteriorate the user experience of time, but we believe it may be a little early to tell if these virtual communities will become ghost towns.

YouTube has now moved outside of just social networking and now is regularly used by governments, political campaigns, teachers, and local police to openly collect and disseminate information. Though not interactive in real-time video is a perfect medium to embody human-centric connections. The ability to parasite advertisement on clips bodes for a sustainable future for this medium as well.

Though not based as firmly on reality as FaceBook and YouTube, SecondLife is now supporting virtual conversations with live audio. It will be interesting to see this mix of virtual and real in contexts where identity is not always a traded commodity.

2.2 eLearning

The Massachusetts Institute of Technology (MIT) pioneered a project in the early 2000's that would go on to create a model for other institutions. The project was MIT Open Course Ware (OCW) which envisioned over 1500 courses be accessible to anyone with an Internet connection at anytime.

A simple search in iTunes shows that a host of other universities have now followed suite in this open exchange of knowledge. In fact, *iTunes U* is the name given to this by apple, and they host over 30,000 college and university audio and visual files[9]. Using the Web as a supplement for classes is also common practice at universities. Classes are almost always accompanied by a class website that hosts notes and other information relative

to the class. This is taken to the next level with Web applications such as Blackboard [10]. These systems take a step up from pedestrian class sites by allowing not only notes, but chatting between students, and very basic tests that are either multiple choice, or require integer answers so they can be marked by a script. This trend of integrating the Web into the classroom comes with its own list of questions that get raised about how effective it is, and how does one test in such an environment where there is no invigilator?

As first movers in this space, MIT again has offered a solution unique to today's uses for the Web. They allow certain standards tests to be done from the convenience and comfort of the student's home, and from their personal computer. The MIT Online Assessment Tool (iMOAT) [11] allows students to be tested on their writing skills in a way that is not only more natural, but more realistic for when they are writing papers for their classes, in their rooms, and on a computer.

The issue of how effective these approaches are addressed by facts obtainable from an MIT OWC website [12]. MIT shows that 95% of people that use the site found it made them more productive. It also shows that almost half of the educators who have visited the site have used OCW content to improve their own teaching. Finally 71% of all students at MIT reported using OCW in their research and studies.

Although most of the above applications of the Web being used hand in hand with teaching at the post secondary level, it also maps down frequently to the high-school level where it is even more important to reach out to the prospective university students. At this level the more traditional way is to reach out to students through outreach activities that require direct contact with the student. But, leveraging the resources that are available via OWC to reach out in a virtual way, MIT is exposing students to science material improving general science, technology, engineering and math (STEM) awareness [13]. This program is unique however because it does not only reach out to students to try and get them aware of these subjects, but also, and arguably more importantly, to teachers. They encourage the use of their material to also help stimulate interest in STEM directly in the school.

As outlined above there are currently some impressive strategies and technologies available to enhance learning via the Web. The problem is there are still substantial gaps in the products currently available, and also the limits of current computation. iMOAT's idea to have the tests written at home in a comfortable environment is no doubt the environment that students will be producing their work throughout the term in. However this method has its limits—for instance how do professors know that their students are filling out their own work? In current applications like Blackboard there is the ability to have testing, but usually they are only tiny percents of the overall student mark. How could a large scale midterm or exam be completed and graded efficiently, without having the increased risk of plagiarism?

Another issue is the complexity that can be tested over a online system at the moment. With something like an English class it is possible to submit work online, but as soon as equations and symbols become part of the solution set it becomes substantially harder to create files to submit, and potentially even challenging to grade and provide feedback on them.

2.3 Current Intersection
Although we do not quite have the resources and infrastructure to create a perfectly fluid and dynamic application for eLearning, we have certainly taken steps in the right direction. In her PhD thesis, Elisabeth Sylvan outlines a network of clubhouses that share their projects (programs created with a visual programming language) with other club houses around the world [14].

Second Life is also moving in the direction of personal interaction in a 3D environment becoming something that is much more life like. Already you can create your own clothes, furniture, and other objects. Currently there are plans to integrate Scratch [15], a visual programming language, into SecondLife to allow the creation of objects much faster and more intuitively. This allows there to be graphical languages to program graphical applications.

The important feature that both the previous examples hold is the ability to let personal relations flourish in a cyber world, and for a reflection of self to be a part of that world. Both of the systems above are not dependent on traditional bounds that are given to cyber environments. They allow the user to mold the environment to exactly what they want. It allows worlds to be dictated by the users, much like their own physical world is.

It is important that we continue to allow this translation to exist. We must allow users to define the environment they are in, because when this happens, features from the real world start to be transferred into the virtual one. Once this happens we start to gain a sense of community, true friendship, and something subtle that leads to trust. Once we start to have trust in a virtual world, we start to unlock all the possible that trust grants real life interactions, from writing an exam, teaching relationships, and business transactions.

3. THE FUTURE WEB
We envision that, though each of Social Networking and eLearning will continue to evolve on their own, the current trajectory will land us in a much richer intersection of the two. This intersection will be sensitive to learning styles and cultural context, as further described below.

3.1 The Merger: eMOTE
eMOTE (electronic Mutual Teaching Environment) effectively addresses the issues outlined above by taking advantage of the trajectory of several factors in the future (1) computer processing power, and (2) the ability to utilize the increase in network speeds, and capacity of the Internet.

As seen above, trust is a key issue to the reliability of cyber interactions. eMOTE adds a key variable to the equation by adding fluid transactions. What we mean by fluid transitions is the ability to have the same dynamics in a cyber world as one would in a real life situation, with the same subtle feedback loops that typically are almost undetectable.

eMOTE would create a new extension to a Graphical User Interface (GUI) by adding a new level to the mix, namely the human factor, we call this layer the Humanized User Interface (HUI). Central to this theme is the need for realtime video conferencing, not just avatar representations of participants.

This layer will require software that allows the users to see, hear and interact with each other in a way that mimics a real life conversation. This requires that video be crystal clear, without lag, and the audio be perfect with no patchy parts, or mystery sounds that end up factoring in to how effective a meeting was. Currently Skype is taking steps in this direction that not only increase video quality and audio, but also make use of parts of the computer that

are traditionally left dormant with most of today's software (the second processor of a dual core!).

More importantly, on the education side, we need ways of understanding the semantics of a student's response to a given question. That is, in order for global education to scale, feedback needs to be automated beyond simple multiple choice answers. Current limitations in semantic representations must be enhanced for this approach to achieve fruition.

The need for software to process and understand different variants of the same theme, language, and in the end allow for automatic feedback to students will be an integral part to Web based global education initiatives. This would allow students to take classes via the Web without having to leave their communities at all, but they would still be getting the valuable connection that can only be done right now if people have the luxury to travel to and from a place of learning.

This is the point where we believe social networking and elearning intersect in the future of the Web. What is needed: for learning in a virtual world to be even more effective and diverse than it currently is in the real world. The gap between the social networking done in the classroom and online worlds becomes linked with projects like OWC, but must be further augmented with a humanized feedback loop. This is the key to eMOTE, and in turn what we believe to be the future for global virtual learning.

4. CONCLUSION

Our belief is that the future Web will be a key source of an improved system for global education. The system will afford excellence through diversity—something that is arguably lacking in ivory tower representations of post secondary education as it is now. We believe the current trajectory of Web evolution highlights the need to incorporate human-centric factors, in particular, those that are conducive to diverse educational environments. The merger of trust relationships as they are emerging in social networking and online teaching environments will introduce subtle emotional feedback loops, and we look forward to future generations of the Web that will result from this new form of emergent behaviour.

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