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Digital Faces on the Cloud

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1. Introduction

Videos of practice problem solutions have been used extensively at Texas A&M University in College Station for a number of years. When counters have been inserted in the website where these videos reside, thousands of hits by students have been recorded. Students have given positive feedback to instructors about the videos. They particularly like the ability to pause and rewind the video, a feature not available in a live lecture. Students who are reluctant to speak up in a lecture class appreciate the opportunity to review the video over and over, pausing at points that are critical to their own understanding.

The Second Life environment has been growing over the last four years(Harris &Rea, 2009). As was shown in the background research, it is being used more for mathematics instructions in the last two or three years, with positive results. Students enjoy the virtual world and the anonymity it provides to open the door to more interaction and to decrease the anxiety about asking questions about mathematics problems. The Second Life environment is ideal for solving the problems that need to be addressed for increased participation in Science, Technology, Engineering, and Mathematics (STEM) majors by

1. stimulating the interest of more students.
2. providing support to ensure that they have the required mathematics background knowledge for STEM majors.
3. providing social interaction and collaborative learning opportunities for students.

Second Life seems to be the most appropriate environment in which to develop the maximum success.

Moreover, mathematics anxiety can be extreme; often caused by having a negative attitude due to a previous bad experience. Studies show that one-half of all students in a developmental mathematics class suffer forms of this type of anxiety. The good news is that a student can manage this behavior but they must learn to manage both the stress as well as improve the basic mathematic skills.

The goal of this project is to increase interest and enjoyment in mathematics to entice more students to excel in mathematics. In particular, success in college calculus is very important to the goal of engineering majors in Qatar. As the background research indicates, there is a dire need for strategies to increase success in college calculus in order to reach the goal of a highly skilled technological workforce with knowledge in science, engineering, and the underlying mathematics necessary for these fields as well as to prepare the undergraduate engineering students to work on meaningful, real-world problems in the short time while they are studying at college and to contribute to research after they graduate without spending valuable time learning on the job.

Data mining tools predict future trends and behaviors, allowing researchers and organizations to make proactive decisions. Data mining predicts the hidden information in the database unlike typical statistics. Therefore the clustering algorithm that will be used in this project should detect characteristics of students studying mathematics. Moreover the cluster analysis can be generalized to other grouping and would be capable of detecting other similarities as well [Jones, & Gupta, 2006; Jones, 2009). Flow chart and stages as seen below in figure 1.

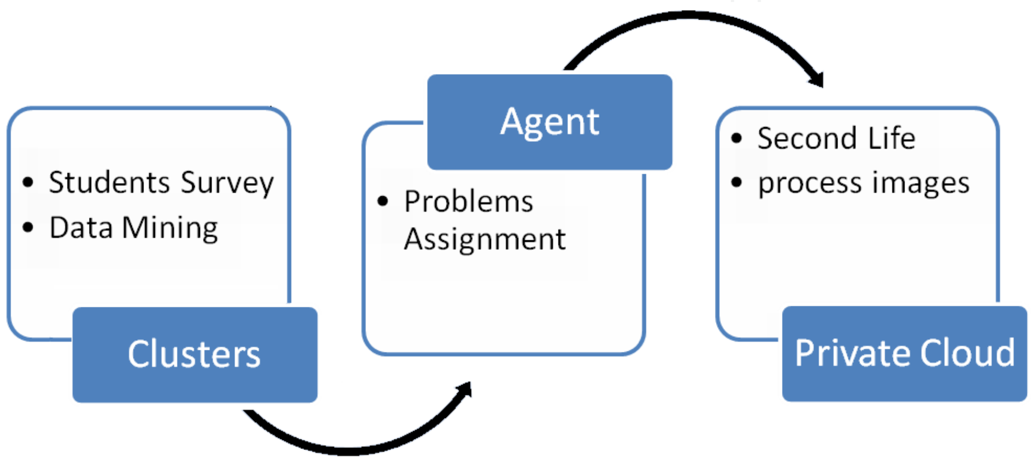

Fig. 1. Flow chart of stages of project

Clustering Techniques

Clustering is a division of data into groups of similar objects. Each group consists of objects that are similar between themselves and dissimilar to other groups. Most commonly techniques are the following:

Data clustering: is the process of dividing data elements into classes or clusters so that items in the same class are as similar as possible, and items in different classes are as dissimilar as possible,

Hard clustering: where data is divided into distinct clusters, where each data element belongs to exactly one cluster, and

Fuzzy clustering: where data elements can belong to more than one cluster, and associated with each element is a set of membership levels. These indicate the strength of the association between that data element and a particular cluster.

In this project we will be using the clustering technique (K-Means) where the main idea is to place each point/ student in the cluster whose current centroid it is nearest. It works with numeric data only as follows:

1. Pick a number "k" of cluster centers (randomly).
2. Assign every item to its nearest cluster center (using Euclidean distance)
3. Move each cluster center to the mean of its assigned items
4. Repeat the steps until convergence.

Therefore, given a set of observations ($\mathbf{x}_1$, $\mathbf{x}_2$, …, $\mathbf{x}_n$), where each observation is a ***d***-dimensional real vector, the ***k*-means** clustering aims to partition the ***n*** observations into ***k*** sets ($k < n$) $\mathbf{S} = \{S_1, S_2, \ldots, S_k\}$ so as to minimize the within- cluster sum of squares:

$$\underset{S}{\arg\min} \sum_{i=1}^{k} \sum_{x_j \in S_i} \left\| x_j - \mu_i \right\|^2$$

where $\boldsymbol{\mu}_i$ is the mean of points in S_i.
and the Euclidean distance equation is:

$$d(i,j) = \sqrt{(\text{I}x_{i_1} - x_{j_1}\text{I}^2 + \text{I}x_{i_2} - x_{j_2}\text{I}^2 \cdots + \text{I}x_{i_p} - x_{j_p}\text{I}^2)}$$

Where:

$$d(i,j) \geq 0$$
$$d(i,i) = 0$$
$$d(i,j) = d(i,j)$$
$$d(i,j) \leq d(i,k) + d(k,j)$$

This chapter sections are organized as follows: section 3 will contain the Review of literature and 3.1 Mathematics Achievement Using Interactive Games; 3.2 Second Life Environment; 3.3 Cultural difference in coeducational school. The rest of the chapter sections are organized as follows: 4. Proposed Research; 5. Engineering Calculus Successes at TAMU Qatar, 6. The Approach, 6.1 Step1, describes the model applied and developed to new data based on distances using the Euclidean distance, 6.2 Step 2 describes the results of the cluster analysis modules developed for Second Life, 6.3 Sep3 talks about the typical uses of cloud and its activities, 7. Grid Computing, is the large-scale cluster computing to be used for public collaboration which is known as peer-to-peer computing which is computers acting together to perform very large tasks, 8. Grid and Cloud Computing is the Grid and Cloud Computing concentrates on high performance computing, Web services and grid services, 9. Results and Summary contains the output of the project which showed that the students are learning a great deal from the rewards and they finished the tasks within 52% less time which is about half time, 10. Conclusions explains that the global social networks are changing and transforming, the old ways of education which is a challenge to some of us. This study has already demonstrated some benefits to students using collaboration tools, video, and mobile technology to minimize the Math anxiety in the classroom, 11. Future Work expects that this may include remote mentoring between multicultural teams and systems monitoring as well as writing an iPhone application, and section 12. Benefits and Concerns discuses Second Life and the applications that can be developed and deployed in a 3D.

2. Background

Texas A&M University at Qatar (TAMUQ) is a branch campus of the main campus in College Station. Students at Qatar get their degree from the main campus and are allowed to spend time taking classes in either campus. Most faculty members in Qatar have been relocated from the main campus to teach the same classes they teach at the main campus.

Since the fall of 2003, Texas A&M University at Qatar has offered Bachelor of Science degrees in chemical, electrical, mechanical and petroleum engineering. In addition to engineering courses, Texas A&M University at Qatar provides instruction in science, mathematics, liberal arts and the humanities. The curriculum offered at Texas A&M at Qatar are identical to the ones offered at the main campus in College Station, Texas. Courses are taught in English and in a coeducational setting. The goal of TAMUQ is: to strengthen the University's presence nationally and internationally through teaching and learning and develop student participation and leadership in relevant technical fields.

3. Review of literature

Important factors predicting success in calculus among freshmen engineering students included a student's ability to regulate his own learning in areas of classroom engagement and time on task (Mwavita, 2005). Certain personality variables such as persistent, responsibility, and patience contributed considerably to the prediction of success in college calculus classes (Shaughnessy, 1994).

For many students calculus has become a stumbling block in the path to careers in science, technology, engineering and mathematics. In a 2010 study, 30% of students who took calculus in high school were placed into pre-calculus in college. Students believed they already knew the material when they entered college calculus, but were stunned to find that they did poorly in the first half of the course. Few actually managed to successfully complete the course. It is necessary to find a way to smooth the transition into college calculus and be sure students are ready for the challenges they face (Bressoud, 2010).

The University of Nebraska at Omaha developed a procedure to implement calculus placement. A calculus readiness test was given initially, with reliability and validity measures computed. At the end of the semester, a comprehensive final was given, with reliability and validity measures computed. Then the correlation coefficient between calculus readiness test scores and final exam scores was calculated and found to be statistically significant, with $r = .42$ and $r = .55$ for the two forms of the readiness test (Stephens & Buchalter, 1987).

Many colleges are facing difficulties with success rates in engineering and other majors that require proficiency in calculus. In a study of actuarial students at Bryant College success in calculus was an important predictor of success in the major (Smith, & Schumacher, 2005).

A study on retention of underrepresented minorities revealed that only 35% of all students who begin college as science, engineering, or mathematics majors graduate in one of those fields (Smith, 1995).

King Fahd University of Petroleum and Minerals (KFUPM), in a study on the preparatory mathematics and English courses, also examined the effect of lowering the level of prerequisite knowledge, based on grades in the preparatory courses in mathematics. Results showed that the students who entered calculus with lower grades in prerequisite courses were generally not successful (Yushau, & Omar, 2007).

Several factors are important in designing a successful intervention for student success in engineering calculus. Educators must consider mathematics deficiencies as well as placement into the appropriate college course. One college pre-calculus revision to increase mathematics learning included

1. smaller class size
2. student collaboration in small groups

3. problem based learning. Three classrooms, each using one of these nontraditional approaches were compared to a traditional classroom.

Students who needed to improve skills for success in calculus were randomly assigned to one of the four sections. Student test scores on four common exams revealed that students in the problem based learning class performed better than students in the other three classes, one that used a traditional approach, and two that used other nontraditional approaches (Olson, Knott, & Currie, 2009).

A discussion-based seminar format was deemed a successful strategy for teaching various levels of college mathematics. Students were required to read textbook materials, work relatively simple exercises, and submit a short reaction piece to the professor before attending class so that they were prepared for the discussion. More difficult homework exercises were completed after the class meeting. The professor believes the primary benefits of the seminar type instruction in his classes of size twenty or less were that students become more independent and more successful life-long learners of mathematics (King, 2001).

The Rochester Institute of Technology implemented a process by which a calculus project was designed and piloted, resulting in increased calculus success rates. A placement exam was used to place students who were considered at risk for failing calculus into a course that integrated Precalculus review as needed throughout the calculus (Maggelakis, & Lutzer, 2007).

The Emerging Scholars Program developed by the University of Texas Austin was used to add workshops of class size about 25 with collaborative learning to all calculus classes, in addition to the regular four lecture hours. The change was expensive but resulted in a 16.3% increase in student success in Calculus I. California State University Los Angeles also added workshops to several calculus courses, and found that it increased success rates. Students have asked that the workshops be added to some other courses. The university planned to implement the model in Precalculus and remedial math courses (Subramanian, Cates, & Gutarts, 2009).

Similar results were reported in the McNeill Program at the University of Colorado at Boulder with at risk students in college mathematics courses involving workshops and collaborative learning (Mendez, 2006).

3.1 Mathematics achievement using interactive games

Using technology in the mathematics classroom supports different teaching and learning strategies and objectives (Ozel, Yetkiner, & Capraro, 2008). The use of games fosters mathematical learning and encourages students' mathematical processes (Su, Marinas, & Furner, 2010). In particular, students typically apply mathematical skills and processes such as reasoning, deduction, and pattern-finding when playing computer games. A study showed that students also tended to stay on task longer when playing games requiring computations and problem solving (Hui, 2009). Role-playing games provide a motivating strategy for students to practice skills already learned (Ahmad, Shafie, Latif, 2010).

Fewer studies have been done on mathematics games at the secondary or college level. However, one such study asserted that results of mathematics computer games showed a statistically significant improvement in mathematics achievement on students in an urban high school (Kebritchi, Hirumi, & Bai, 2010).

A study on reviewing calculus skills, finding derivatives and evaluating integrals, showed that using an interactive game was successful (Forman, & Forman, 2008). In general, interactive games have had positive effects on interest and motivation in mathematics (Su, Marinas, & Furner, 2010; Ahmad, Shafie, Latif, 2010; Kebritchi, Hirumi, & Bai, 2010; Jones, 2009).

3.2 Second Life environment

Second Life is an online 3D virtual environment that

1. allows participants to engage directly and interactively,
2. provides an opportunity for rich social networking, and
3. provides opportunities for collaborative work (Jones, 2009; Bourke, 2009; Cheong, 2010; Lucia, Rancese, Passero, & Tortora, 2009). Second Life information is generally freely available to all residents (Jones, 2009), although the client uploading content for a virtual classroom pays a fee for upload access. Second Life has the capability to support not only asynchronous distance learning products but can also support synchronous lectures and increase interaction and communication opportunities between teachers and students [Lucia, Rancese, Passero, & Tortora, 2009).

3.3 Cultural difference in coeducational school

After conducting interviews at a variety of public and private co-ed schools, all-girls schools and all boys schools it was noticed that "the real variables affecting a girl's performance seems to have more to do with class size, and the expectations of society and the family. The size of the group, affects their ability to speak out and to feel comfortable in expressing themselves. Adding to that the problems of discipline that may arise in the class and it's easy to understand why quieter students, or those who lack confidence, might be intimidated.

Moreover more studies in the literature cited that the popular belief that girls will do better academically at single-sex schools is not sustained by the data. School type does not appear to be an important factor in attempts to improve the performance levels of girls in mathematics and science however the Mathematics anxiety and lack confidence does.

Finally, it is already established in the literature the need of graduates to have skills working with the digital communications tools as well as having long life learning skills in the real and the virtual environment. Moreover, accreditation criteria include the problem solving and team shearing particularly in Engineering is required by utilizing a variety of technologies.

4. Research

This research uses learning tools with collaborative opportunities with the main campus of Texas A&M in Second Life using private cloud to improve student success in engineering calculus.

It will bridge the gap in knowledge, using interactive games and social networking in the context of success in mathematics conceptual knowledge and skills necessary to be successful in Engineering, and Mathematics.

The purpose is to investigate different online e-technology methods used in Mathematics classes at Texas A&M University at Qatar to accelerate learning and detecting the best practice in using them in education. Five different software applications and class management systems used in Calculus I and Calculus II for Engineers which are: Turning Point System for students’ attendance, 3D online system (Second life) for conducting help sessions and student meetings, WebCT for posting class notes, grads and notices, WebAssign for online quizzes and practice, and Pod casting for posting solved homework problems and using iTunesU.

The general idea is to produce an intelligent program, called agent, through a process of learning using Reinforcement Learning (RL) which is a Machine Learning technique that has become very popular in recent days. The technique has been applied to a variety of artificial domains, such as game playing, as well as real-world problems. In principle, a Reinforcement Learning agent learns from its experience by interacting with the environment. The agent is not told how to behave and is allowed to explore the environment freely. However once it has taken its actions, the agent is rewarded if its actions were good and punished if they were bad. This system of rewards and punishments teaches the agent which actions to take in the future, and guides it towards a better outcome.

The basic idea is the visual perception of the ability to be familiar with the environment visually. Computer simulation used as follows: Users will sign on their second life virtual space with their virtual names and join a study session whereas a simulation by computer images is mainly focused on their images processing machine vision digital input/output that will be fed to computer networks to observe the behavior in a computer grid format.

Data mining tools used to predict future trends (Neel, 2011). It predicts the future and the hidden information in the database. Data mining tools can answer questions that traditionally were very time consuming to resolve and experts may miss because it lies outside their expectations. The most commonly techniques used in data mining are artificial neural networks, decision trees, and clustering which used in this research.

5. Engineering calculus successes at TAMU Qatar

Since Qatari students are approximately the same age as United States students and are exposed to very similar mathematics curriculum, it is expected that similar interventions are needed to address the needs of students who wish to major in STEM fields at Texas A&M University at Qatar.

A pilot study conducted by the author at Texas A&M University at Qatar revealed that students were very productive and engaged in the learning experience and the average student's attendance during any session is 98% of the time. Moreover a subculture difference has no appearance in the virtual world for exploring cultural alternatives. Jones (Jones, 2009; Jones, S. L. 2009) also noted that the collaborative aspect available in Second Life does not exist in any other online platforms.

As was seen in the literature background, this is an important feature. Jones also found that the average of student group project grades was seven percentage points higher than that of students who did not use Second Life (from 72% to 79%). A snapshot of a class in Second Life at TAMU Qatar is shown (see figure 2).

6. The Approach

6.1 Step1

A model created by evaluating training data using domain experts' knowledge. Then the model applied and developed to new data based on distances using the Euclidean distance (see figure 3).

Then based on the distances we create the classes (see figure 4).

Fig. 2. Second Life at TAMU Qatar

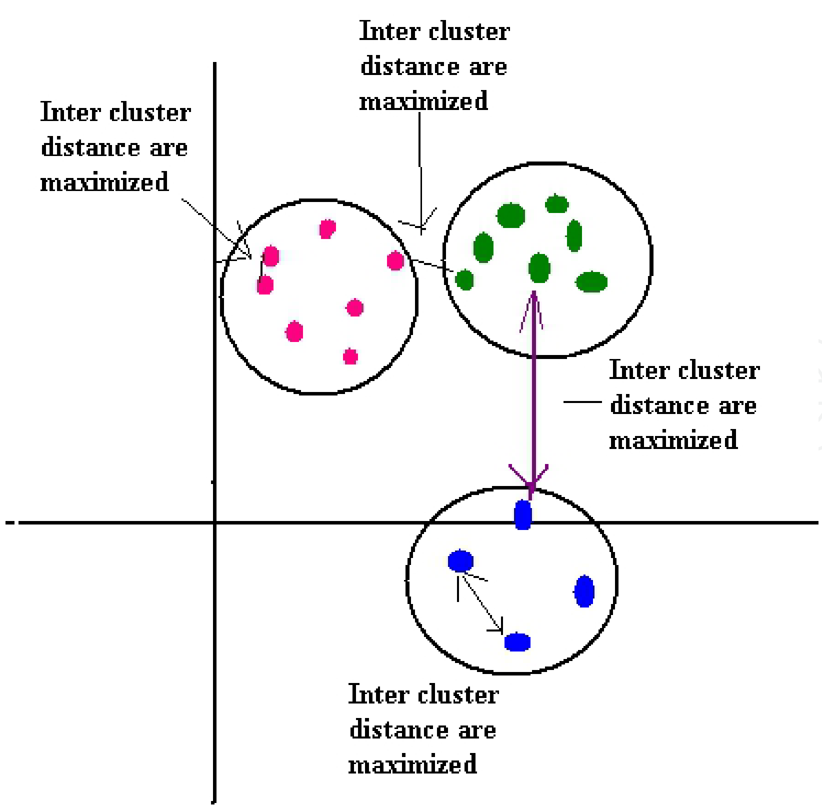

Fig. 3. Euclidean distance

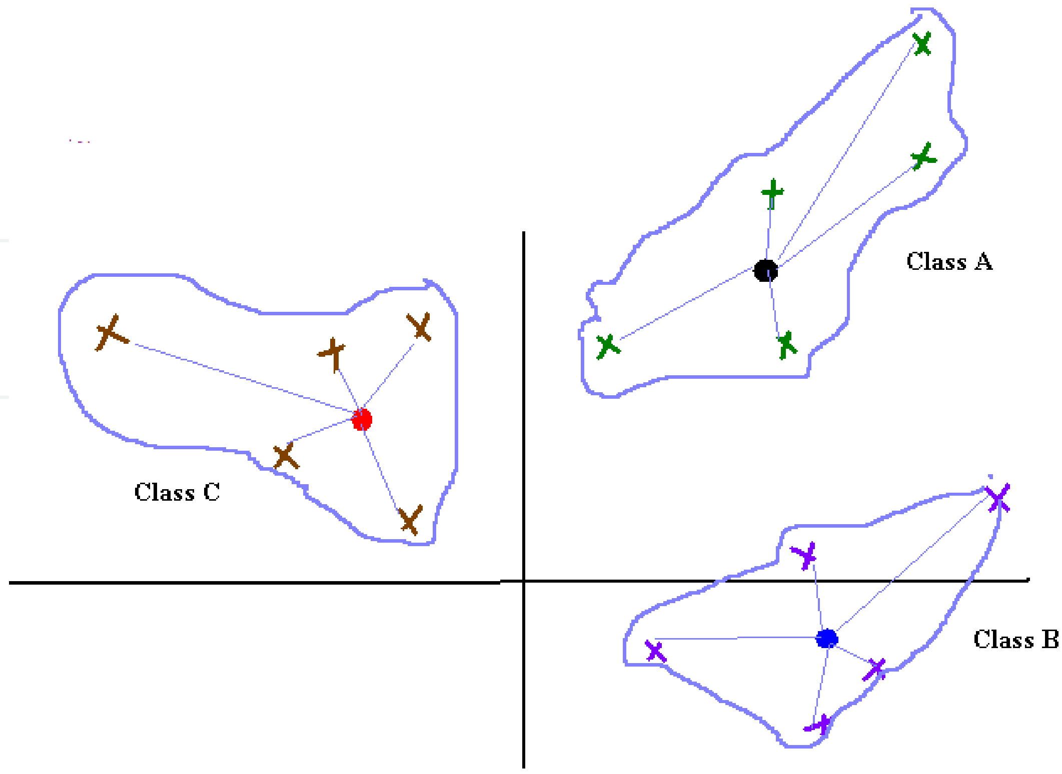

Fig. 4. New classes

This algorithm will minimizes the intra-cluster variance however the results will depend on the initial choice of weights. Thus we will repeat the algorithm with different weights until it converges (that is when the coefficients fail to change between two iterations) and each time we will compute the centroid for each cluster. Based on the learning preference choices after an assessment test we will choose the number of classes based on the outcome. We will assign membership to each student based on their preference of learning. For example, if a student has a membership value of 0.0, thus he/she is not a member of this class. However if a student likes to learn using more than one method the he/she could have a memberships in more than one class (partial member to more than one group) and lastly if the student has a membership value of 1.0 that means he/she belongs only to this group.
By assigning memberships we will know our population better and we will design the learning and teaching modules based on that outcome. For example, see figure 5.

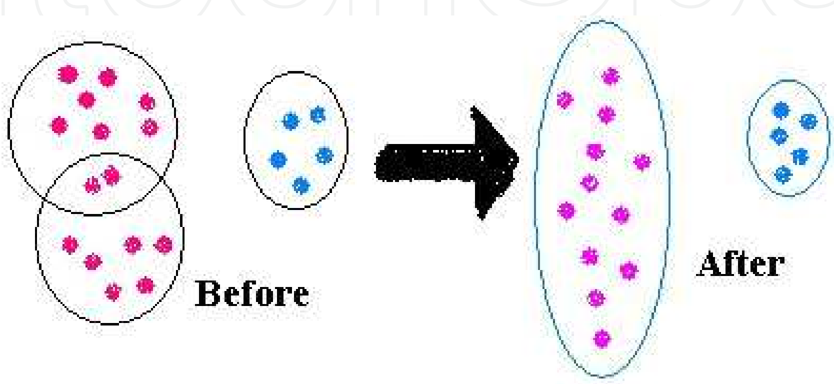

Fig. 5. Memberships assignment

6.2 Step 2

Based on the results of the cluster analysis modules developed for Second Life. The modules designed to address the issues revealed in the analysis and to benefit of all future Qatari college students desiring to pursue STEM careers.

For each topic, lessons developed around student weakness and materials provided in a format that is downloadable to computers, iPad, iPod, or G3 phones as well.

These modules are tailored to students here in Qatar based on the clustering and classes model that been developed and that will differentiate them from one method fits all which is on the market place. Moreover these modules can be modified very easy.

Lessons include the following:

- Instructional videos. These are less than 10 minutes each so that students may focus on very specific instruction to meet their individual needs. *Camtasia* software used to create the streaming videos. Instructional videos may be focused on concepts, definitions, and theorems, but will usually include an example.
- Problem Videos. Additional videos showing how to work additional problems will be provided for many topics. *Matlab* is used by students for more complex problems.
- Games. For many topics, simple interactive games to practice skills developed using flash animations.
- Assessments. Each module will have an assessment so that students will know when they have mastered the skills necessary to apply knowledge of the topic to the college calculus course (see figure 6).

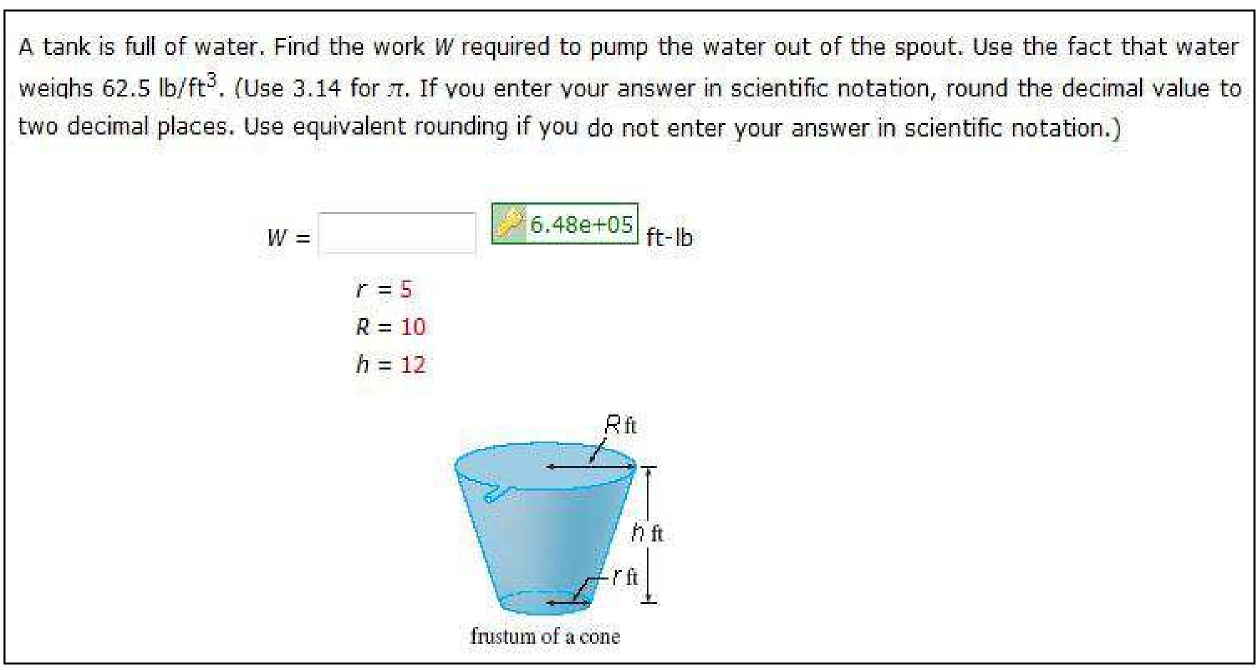

Fig. 6. Class activity sample

Internal reliability on student scores for this project is expected to be acceptable as well. The instrument using a Likert scale to measure attitudes about mathematics learning in a face-to-face regular class and a virtual classroom is developed as follows with these questions:

1. How comfortable are you in asking questions in a regular face-to-face classroom?
2. How comfortable are you in asking questions in a virtual classroom?

3. How comfortable are you working on problems in a face-to-face classroom?
4. How comfortable are you working on problems in a virtual classroom?
5. How often do you have opportunities for collaborative learning in a face-to-face classroom?
6. How often do you have opportunities for collaborative learning in a virtual classroom?

Learning Model using cloud-based strategy

We use to think that having our documents and financial statements on our computers is the only safe place for them. Now, cloud computing has changed our way of thinking.
A cloud is basically a giant server that we access remotely; typically with a mobile device or a computer since with cloud computing we only need a mobile device or a monitor and keyboard to access the information. If we are using hotmail, yahoo mail or facebook then we are using the cloud since the e-mail in not on our own device but it is somewhere on a server and we just have access to it with a login id.
Clouds exist all over the world and are mostly operated by giant corporations such as Google, Yahoo, and Amazon. Now Texas A&M University at Qatar has teamed up with IBM, Carnegie Mellon at Qatar, and Qatar University to create a consortium called Qatar Cloud Computing to the Middle East (Qloud). The Qloud is developing courses on cloud computing and have an environment for industry experts and researchers.
Students at Texas A&M University at Qatar (TAMUQ) are no longer having to travel miles to experience life at the main campus in Texas. Students could interact virtually with students at the main campus and enjoy the interaction with the students on the other side.
Here at TAMUQ students take as many courses as they can in the first few years in the Qatar campus and then relocate to university's main campus in Texas-USA during their senior year working on the rest of their courses if they wish.
The cloud is on-demand computing, for anyone with a network connection accessing applications and data anywhere, anytime, from any device these are similar to Facebook or e-mail which are repositories for data and we can access this data from any internet-enabled device, from our iPhones to our desktop computers. From the consumer point of view, the storage of digital images or e-mail messages is stored somewhere in the cloud. We don't need to know where specifically, we just can to use it with a valid id and web connection. No doubt that cloud computing is the next big wave in computing. It is changing what we are using on our desks and schools and how we access and share documents.

6.3 Sep3

Typical uses of cloud

1. For usage as a personal workspace that can be accessed anywhere, anytime (see figure 7).
2. For Personal Learning Environments, students can have personalized tools to meet their own personal needs and preferences (see figure 8).
3. To minimizes the need to back up all files or transfer files from one device to another
4. To use large amounts of processing power for solving big problems
5. For teaching and learning so instructors can use YouTube, iTunes, e-mail, or mic on the cloud (see figure 8).

Fig. 7. Cloud activities

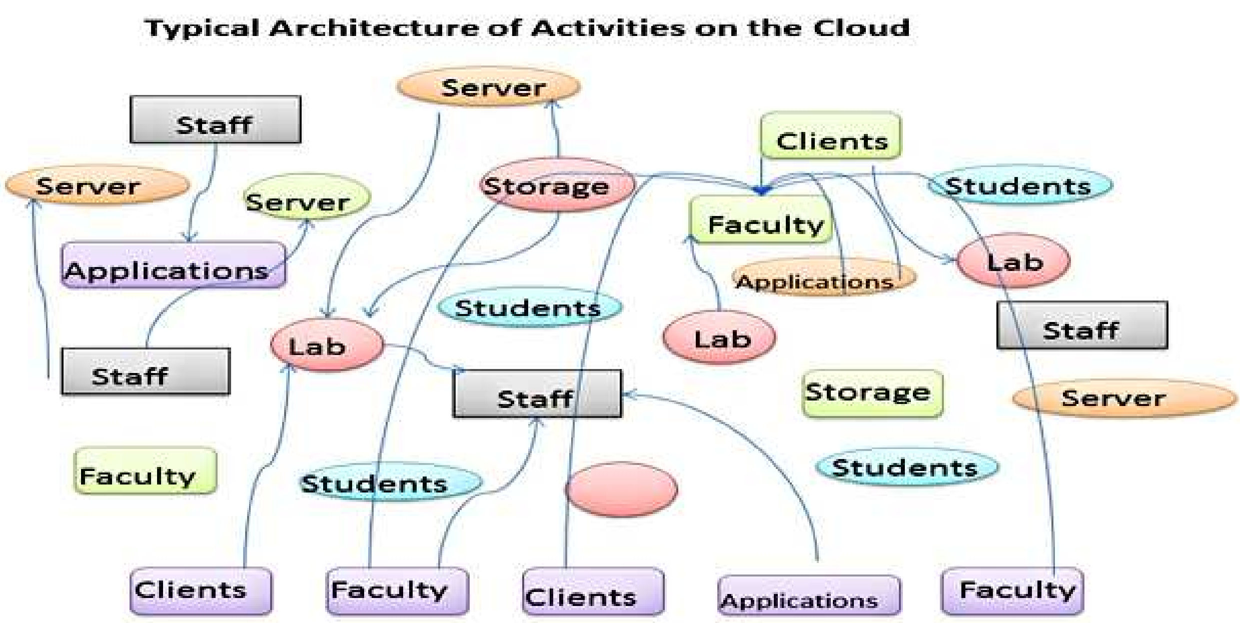

Fig. 8. Architecture of activities on cloud

7. Grid computing

Grid computing – the use of a *computational grid* -- is applying the resources of many computers in a network to a single problem at the same time using large amounts of data (SAS, 2010). It also could be referred at the combination of computer resources from multiple domains to reach a common goal. It can divide a program to as many as several thousand computers and can be thought of as large-scale cluster computing and can be confined to the network of computer workstation or it can be a public collaboration which is known as peer-to-peer computing.

Grid computing are distinguished from conventional high performance computing systems such as cluster computing because grids tend to be more loosely coupled -- computers acting together to perform very large tasks -- and geographically dispersed. However, it is more common that a single grid can be used for a variety of different purposes (Liang, Gang, & Yifei, 2011).
Therefore, grid computing appears to be a promising because it suggests that the resources of many computers can be cooperatively and perhaps can be connected together and managed as collaboration toward a common objective and with our awareness.

8. Grid and cloud computing

This is the power of all time computing; creating a single universal source of computing power by making computational and data resources available to users and applications programmers on a scale never before possible. The Grid and Cloud Computing concentrates on high performance computing, Web services and grid services.
The *Dedicated server* is slowly starting to vanish and being replaced by *Cloud Computing*, however people are still afraid of security issues and letting go of their data on the cloud.
It is predicted that as they start getting on the cloud bandwagons, they would be using *Virtual Private Server* (VPS) which is fairly common among hosting solutions on the cloud where people share resources with the other clients on a particular server.
A set of characteristics that helps distinguish cluster, Grid and Cloud computing systems is listed in Table 1. The resources in clusters are located in a single administrative domain and managed by a single entity whereas, in Grid systems, resources are geographically distributed across multiple administrative domains with their own management policies and goals. Another key difference between cluster and Grid systems arises from the way application scheduling is performed. The schedulers in cluster systems focus on enhancing the overall system performance and utility as they are responsible for the whole system. However, the schedulers in Grid systems called resource brokers, focusing on enhancing the performance of a specific application in such a way that its end-users requirements are met. Cloud computing platforms possess characteristics of both clusters and Grids, with its own special attributes and capabilities such strong support for virtualization, dynamically composable services with Web Service interfaces, and strong support for creating 3rd party, value added services by building on Cloud compute, storage, and application services. Thus, Clouds are promising to provide services to users without reference to the infrastructure on which these are hosted (see table 1).

9. Results and summary

Students were positive with the help and the feedback given by the system agent they are using and they are learning from the rewards given by the engine.
This experiment was sufficient enough for generalization however, by adding more subjects and sample problems that will be solicited to allow for reliability and testing of the model. As well as testing the mechanism against empirical data.
Students finished the tasks within 52% of the normal assigned time which is about half time. They were delighted by the end of the task and had a positive experience.

Key characteristics of clusters, Grids, and Cloud systems.

Characteristics	Systems		
	Clusters	Grids	Clouds
Population	Commodity computers	High-end computers (servers, clusters)	Commodity computers and high-end servers and network attached storage
Size/scalability	100s	1000s	100s to 1000s
Node Operating System (OS)	One of the standard OSs (Linux, Windows)	Any standard OS (dominated by Unix)	A hypervisor (VM) on which multiple OSs run
Ownership	Single	Multiple	Single
Interconnection network|speed	Dedicated, high-end with low latency and high bandwidth	Mostly Internet with high latency and low bandwidth	Dedicated, high-end with low latency and high bandwidth
Security/privacy	Traditional login/password-based. Medium level of privacy – depends on user privileges.	Public/private key pair based authentication and mapping a user to an account. Limited support for privacy.	Each user/application is provided with a virtual machine. High security/privacy is guaranteed. Support for setting per-file access control list (ACL).
Discovery	Membership services	Centralised indexing and decentralised info services	Membership services
Service negotiation	Limited	Yes, SLA based	Yes, SLA based
User management	Centralised	Decentralised and also virtual organization (VO)-based	Centralised or can be delegated to third party
Resource management	Centralized	Distributed	Centralized/Distributed
Allocation/scheduling	Centralised	Decentralised	Both centralised/decentralised
Standards/inter-operability	Virtual Interface Architecture (VIA)-based	Some Open Grid Forum standards	Web Services (SOAP and REST)
Single system image	Yes	No	Yes, but optional
Capacity	Stable and guaranteed	Varies, but high	Provisioned on demand
Failure management (Self-healing)	Limited (often failed tasks/applications are restarted).	Limited (often failed tasks/applications are restarted).	Strong support for failover and content replication. VMs can be easily migrated from one node to other.
Pricing of services	Limited, not open market	Dominated by public good or privately assigned	Utility pricing, discounted for larger customers
Internetworking	Multi-clustering within an Organization	Limited adoption, but being explored through research efforts such as Gridbus InterGrid	High potential, third party solution providers can loosely tie together services of different Clouds
Application drivers	Science, business, enterprise computing, data centers	Collaborative scientific and high throughput computing applications	Dynamically provisioned legacy and web applications, Content delivery
Potential for building 3rd party or value-added solutions	Limited due to rigid architecture	Limited due to strong orientation for scientific computing	High potential – can create new services by dynamically provisioning of compute, storage, and application services and offer as their own isolated or composite Cloud services to users

Table 1. Courtesy of (Future Generation Computer Systems 25 (2009) 599_616)

10. Conclusions

The goal of this project is to increase interest and enjoyment in mathematics to entice more students to excel in mathematics. In particular, success in college calculus is very important to the goal of engineering majors in Qatar.

Learning from each other as well as using new technologies for collaborating is an important aspect of education. Therefore, transforming this basic idea into the classroom will promote interactive learning and enhance communication between students and teachers. The modules suggested here been developed based on students' need to encourage them to actively read and practice their subject matter like they do on the social networks sites –i.e. facebook and e-mail. This type of social learning is great for Qatari students because it helps them with the technical reading and practices more English as well as the understanding of the technical content. Moreover, these activities help students to work together in an anonymous way so they are not having any culture discomfort in a co-ed sitting and enable collaborative problem-solving using grid computing on the cloud through the usage of second life (see Figure 9). Moreover, although this model offers fairly good accuracy/efficiency tradeoff, it is believed that further research should explore different ways to try to improve the computational efficiency and the memory usage, by introducing modifications specifically to improve learning.

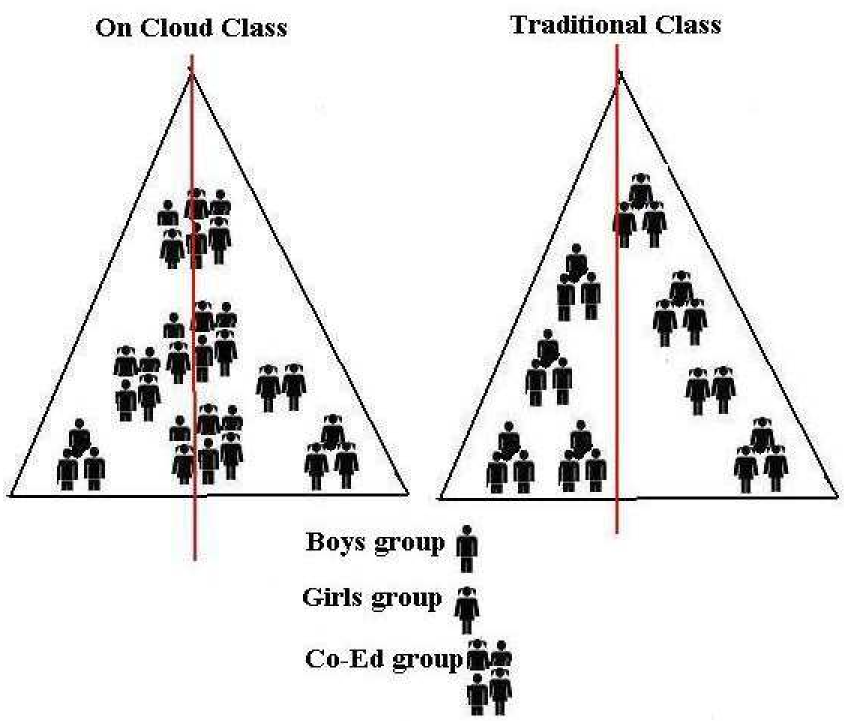

Fig. 9. Coeducational Traditional and on cloud

The global social networks are changing and transforming, the old ways of education. It is a challenge to some of us. This study has already demonstrated some benefits to students using collaboration tools, video, and mobile technology to minimize the Math anxiety in the classroom.

In Second Life environment students are completely focused on the task at hand because if they drift to other activities, their avatar would quickly slump over and fall asleep, which is an embarrassing seen conveying to everyone that his/her mind has wandered off.

Most students had a pleasant experience using the games to learn mathematics and believed that it made learning fun and social. Moreover, the author also believes that second life and other virtual worlds represent a perfect convergence of social media, simulations and gaming which hold promise for a new generation of learners.

11. Future work

Future research will include remote mentoring between multicultural teams, white-board brainstorming, integration of social networking tools, and systems monitoring. As well as writing an iPhone application that aggregates information from several places, including Google cloud and others and make this application available to all via a single intuitive interface on the mobile device--an interface that many of our students are already using. Moreover it is believed to have been a huge success with students; for example, they can get real-time information about new assignment or chat with others students or faculty on their iPhones. Mobile apps are a big part of what is coming. Also, several professors have committed to add social network activities to their courses and in the classroom after learning about this successful study.

12. Benefits and concerns

Cloud computing is web-based computing where our information is no longer stored on our computer but rather on a larger server that we can access with a mobile device. Scalability and flexibility are some of the benefits of cloud computing where we can get 10 computers today and 1000 computers tomorrow. We rent them on the cloud instead of buying them. Therefore, by integrating our new cloud-based applications with our internal systems, we have benefited our IT team as well as our users. Cloud computing has freed us to change the rules in a way that gives IT as much free time. However, some of the concerns are the privacy and security by having our data on a cloud server and not stored on our own machine and of course that required the use of the internet too.

Second Life provides a platform where collaborative applications can be developed and deployed. The advantage of creating an application in a 3D social environment such as Second Life is that it's automatically presence-enabled. You can see who is using it and interact with them at the same time. It supports text chat, voice functions, and avatar customization. Yet there are more reasons to use virtual spaces because students learn more about social aspects, technologies used, architecture, subject matter, and education games

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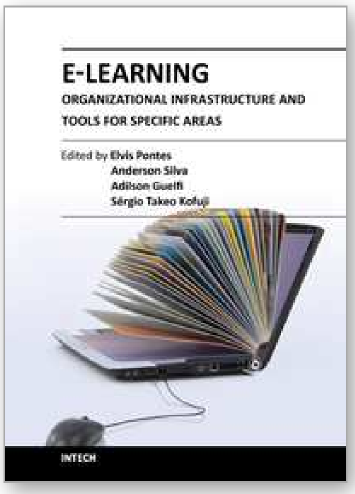

E-Learning-Organizational Infrastructure and Tools for Specific Areas
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Technology development, mainly for telecommunications and computer systems, was a key factor for the interactivity and, thus, for the expansion of e-learning. This book is divided into two parts, presenting some proposals to deal with e-learning challenges, opening up a way of learning about and discussing new methodologies to increase the interaction level of classes and implementing technical tools for helping students to make better use of e-learning resources. In the first part, the reader may find chapters mentioning the required infrastructure for e-learning models and processes, organizational practices, suggestions, implementation of methods for assessing results, and case studies focused on pedagogical aspects that can be applied generically in different environments. The second part is related to tools that can be adopted by users such as graphical tools for engineering, mobile phone networks, and techniques to build robots, among others. Moreover, part two includes some chapters dedicated specifically to e-learning areas like engineering and architecture.