

# Immersive Interactive Learning Environments (A PhD Case Study)

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## Abstract

Teaching and learning is no longer the same and the paradigm shift has not settled yet. In this study we frame immersive learning as a method which we believe can be designed by experiential, constructivist, and collaborative elements. We then present a peer to peer interactive web-based learning tool, which was designed, and implemented in-house and piloted in a PhD course on 'Pedagogical Methods'. We present the results showing how the learning tool has immersive elements and the student outcomes. The tool engages students to learn a specified subject matter, synthesize the information, create question and rate their peer's questions. Tests are then generated by professor from the students' questions. Student performance shows that in such a context, students who spent more time doing the test scored less. In the results section, we also present the item response theory as a more appropriate analysis tool to assess and study immersive learning, and provide examples.

**Keywords:** Immersive Learning, Information Technology, Learning Models, Educational Evolution

## Introduction

The advent of Information Technology (IT) and its impressive worldwide use impacted student learning styles and consequently associated pedagogical models which have evolved from basic unidirectional teacher-to-student instruction into a dynamic IT supported and elaborate learning environment – At least this is the promise and the direction that is evident today. New learning environments today entail 3 Dimensional graphics, computer games, and animation, as well as a whole range of elaborate and wide spread mobile devices of various sizes (that would suit all demographics and contexts) allowing stakeholders in education to innovate throughout the globe and facilitate learning in multiple forms (Ştefan 2012).

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Rooted in the traditional classroom style(s), educators (as part of their profession) are expected to continuously seek teaching and learning improvement to engage all the senses and create more effective elements such as videos, animations and PowerPoint's. However, it seems that classroom experiences continue to be dominated by non-interactive passive learning, especially at the PhD level. In response to the need to utilize

IT's potential and resources in order to enhance the learning environment using more innovative methods, we look into the concept of immersive learning and its fundamental elements. We then propose a web-based learning tool (that meets the immersive learning elements of learning) which was developed in-house and used in a PhD class on 'Pedagogical Methods'. We describe the whole process and present the results. We conclude by elaborating on the potential of such innovative learning tools that can be used in-class or virtually.

### Literature Review

We provide herein a literature review that we conducted as we scan the body of knowledge and seek to understand various styles of learning (that can be used to construct immersive learning activities) such as experiential, constructivist and collaborative, which we believe, together in some combination can provide interesting and effective opportunities for IT to create and engage students in an immersive learning environment. We examine various literature introducing advanced technological inventions of virtual reality in an immersive learning experience to then blend the importance of learning styles with technology to suggest future research ideas in order to contribute to the theory.

Previous research indicates active learning strategies are more effective than traditional passive learning styles (Inks, and Avila 2008). As education is relevant for institutions such as elementary, secondary, university and higher education, education is also relevant in training within the professional world (such as professional selling, manufacturing services, entrepreneurship) where new course delivery methods (such as hybrid, web-based courses) are used based on cost, time effectiveness, quality of the learning experience and individual learning styles and needs. As authors Auster and Wylie (2006) developed a systematic approach to active learning, they include four interrelated dimensions of the teaching process such as context setting, class preparation, class delivery and continuous improvement.

Immersive learning is complemented by various learning styles, Auster and Wylie's context setting involves the establishment of an atmosphere for learning that facilitates student interaction and engagement. Referring to Inks and Avila, (2008), engagement relates to the quality and effectiveness of the learning experience where people learn better when they are fully engaged. It requires students to participate in discussions, reflect on their thoughts, solve problems, and be present in activities by which the learner is required to go through a cognitive process of new information presented (Inks and Avila 2008). An effective, high quality context atmospheres requires a lot of monetary investment, by which researchers use technologies such as virtual realities with gamification and strategies to create an enticing environment for students to learn in. Not only should the environment be attractive but accessible to all those who wish to learn as traditional classroom, or experiential learning require high budget and travelling expenses to gain such an experience.

As for the creation of class preparation, which refers to the content of learning, the ability for educators to represent abstract content such as physics and mathematics in a motivated environment contributes to increasing class involvement (Young 2005; Bobbitt et al. 2000), critical thinking (Sautter 2007; Klebba and Hamilton 2007; Roy 2005), and greater retention of subject content which also increases the confidence of the student involved.

In terms of class delivery, from PowerPoint to blackboard and chalk, the world has evolved into greater graphical delivery content such as 3 dimensional virtual realities which provoke a higher interaction of the content with the student using behavioral elements such as tactile, vision and auditory senses.

Lastly, a passive traditional learning styles creates hurdles in customizing learning content for each student as their behaviors differ and their retention of the information vary from one person

to another. With the start of web-based interactive content, allowing students to learn at their own pace, students and teachers can receive feedback and act in seeking continuous improvement such as coming back to a lecture, reviewing unclear content. Many learning management systems today monitor improvements on a regular basis.

Defining “immersive learning” is dubious as it attaches itself to experiential, constructivist, collaborative elements found in various activities designed to engage the participant. The literature always refers to “immersive learning” as it relates to a specific context and in the presence and facilitation of some form of information technology. In this research study, our literature review revealed that there are three primary perspectives at which “immersive learning” is utilized: In an experiential environment; through a constructivist method; and via active collaboration. We elaborate briefly on them.

**Experiential:** Experiential Immersive Learning (EIL) is represented by activities that allow students to immerse themselves in an artificially constructed world (virtual world) that may resemble reality. As Johnson and Levine (2008) describe, virtual worlds such as Second Life allow students to become part of a constructed world, interact with the virtual environment and learn from simulated experiences automatically created or arising based on a specific series of interactions. (Milgram et al. 1994 ; Ştefan 2012). Students interactions in EIL with elements such as people, activities, quests, tasks, objects and other simulated artifacts present an opportunity that may be hard to create in the real world due to expenses and/or risks (Inks and Avila 2008). For example, students can visit a Nano scale environment in 3 dimensions to examine a photon and travel through a lesson in particles of physics delivered by an avatar of Einstein (Johnson and Levine 2008). This experience provides students with a different view of the subject matter, both memorable and illuminating that traditional classroom were not able to offer. It is also an environment where students can manipulate the parameters of their studies by creating visual effects in real time (Johnson and Levine 2008). EIL is very rewarding and engaging as immersing technologies including virtual reality and collaborative/social systems are now giving students and institutions access to a cost effective customized learning platform solutions (North 2014).

**Constructivist:** Using the constructivist learning method, students are provided with opportunities to learn at their own pace. A constructivist online experience can be created today by customizing an environment designed by difficulty levels taking into consideration a student’s prior knowledge and questioning these students on their unique misconceptions of a subject matter. To that effect, constructivism entails an interesting reflective and introspective element to learning. In an environment where instructors have the ability to create a personal connection, they can engage students in the reflective activities by observation and test them on abstract conceptualization of a specific subject matter, whereby knowledge contained within the activity may be guided or scaffolded. As a method of customization, technologies allow computers to manage student’s opinions, contributions, behavior, motion etc..., which may then update the environment in real time (Biocca and Delaney 1995). In constructivist-based online learning tools, teachers can monitor the learning process of their students. Students can be allowed to be autonomous in their learning such that they can freely travel in the environment, acquire information of interest while teachers can receive feedback on their students conscious and unconscious learning progress (Fernandes, Raja, and Eyre 2003)..

**Collaborative:** Social or Collaborative learning (an activity that is very popular today with all the social networking websites) allows students to capitalize on the opportunity to share and learn from each other. Interactivity plays a crucial role in the world of immersive learning within virtual interactions. As (Kalay, 2004 ) expressed, virtual surroundings allow group learning, similar to in class physical experience, where they are aware of the social process of learning and are affected by the presence and behavior of their peers. Technologies facilitate spatial visualization,

which allows students to discover historic and cultural backgrounds through 3 dimensional graphical reconstructions (Ştefan 2012).

To that effect, collaborative online learning tools become an asset for individuals to create working spaces for distant learners where they can meet, network, exchange experiences and knowledge (Darvasi, 2008). The promised network is from student to student but also student to teacher as well as teacher- to-teacher in a global setting (North 2014).

Immersive learning that draws on IT support, social networking and gamification environment rely heavily on technological advances that utilize advanced graphics, realistic simulation techniques (Biocca and Delaney 1995), complex pedagogical processes and the creation of an environment where students can immerse themselves into experiences of a variety of realistic scenario while developing their cognitive faculties via guided processes.

## Case Study

### ***The Course***

An interactive peer-to-peer learning and assessment web-based interactive tool (P2P tool) was used in a PhD level course (Pedagogical Methods), in the John Molson School of Business, Concordia University, Montreal, Quebec, Canada. This course is mandatory, for PhD students to learn how to become skillful, thoughtful and confident instructors in any teaching and learning setting. The course tasks aim to enable the student to design effective courses that they would be required to teach, to help them acquire deep approaches to learning, and to improve their teaching effectiveness.

Readings and reference material that draw on seminal work in educational theory and practice are discussed and students learn to provide a conceptual framework to construct and refine pedagogical choices for different audiences. At a theoretical level, learning of the course content (primarily behaviorism, cognitivism and constructivism) revolves on the engagement of students at all four bloom levels. Classes are task-oriented. Tasks emphasize collaboration, reflection, and action. By the end of the course students are expected to have developed a Teaching Philosophy Statement, Course Outline, taught in a real class setting, and learned about signature pedagogies that have a high educational impact. Of great importance, is that students engage in discussion about exploring and reflecting on their personality traits, and teaching styles with association to teaching and pedagogical methods that would be appropriately aligned. The learning goals of the course are:

- Articulate student own teaching philosophy and elements of a teaching strategy statement,
- Evaluate good practices in teaching and qualities of highly effective teachers in students' respective area of specialization,
- Lead discussions and teach in ways that promote the conceptual knowledge and follow effective practice,
- Apply basic instructional design elements to construct a course,
- Experience active learning techniques, and
- Enhance communication, presentation skills and drama as means of connecting with the audience.

### ***The Interactive Peer-to-Peer Tool***

The P2P learning tool is a web-based interactive system used for student learning and assessment. It is a tool that involves three phases that encourage the active participation of the students. The tool entails elements of constructivism and collaboration facilitated by a three step process. The

tool is primarily based on the cognitive approach for analysis, synthesis, evaluation and assessment of a specific subject matter related to pedagogy.

The first phase involves the system presenting the students with a peer-refereed article (in the present case, an article published in educational psychology) related to pedagogy. The students are then required to submit questions through the web-based online system. These questions should come from the article read and should be theoretical in nature. The number of question each student should create is predefined by the professor. Once these questions are submitted to the online system, the second phase begins with each student rating each other's questions according to their perception of the level of difficulty each question possesses and level of quality. Therefore, if a question is not clear or even has a typing error or is grammatically incorrect, the students may rate it as low quality. The scales for both difficulty and quality are low, moderate and high. The professor specifies in the system the number of evaluations necessary for each question in order to define consensus. In other words, a professor may accept three assessments of quality to get a reasonable consensus indicative of convergence. For example, if 3 evaluations for each question were selected, then what if a question has one low, one moderate and one high? Three may present a problem; 4 assessments are better and 5 are best (as we have experienced). The P2P learning tool includes an algorithm that distributes those questions to different students and ensures that each student does not get to assess their own questions.

After that all the questions have been assessed, phase 3 is opened whereby the professor creates one or more tests. In this phase, the pool of student generated questions will then be used to create one or more online tests/quizzes where different groups of students can be assigned to take. We would like to note that the student profiles include their ethnic background and gender. This is important because in this phase, the professor can create a test by specifying from which sub-pool of questions (those generated by male/female and/or specific ethnic background) to select the test, and specifying which sub-group of students (gender and ethnic background) to take the test. For example, the professor can create three tests, an easy one based on easy questions, a moderately difficult one and a difficult one. Also, a test can be created from the pool of questions generated by female students and only male students take it (and vice versa). Note that during the selection process of the questions, the system starts by selecting the highest quality questions, and then moves down the quality scores to meet the professor's test setup requirements. An interesting proposition that presents itself with this tool is its extension to a game environment, sort of: girls against boys, and Chinese against Arabs, there creating an even more engaging environment that draws on competitiveness.

During this P2P learning process, students are encouraged to provide high quality questions by receiving additional marks should their questions be chosen to appear in the quiz. The questions are randomized such that each student receives different questions with an equal amount of easy, moderate and difficult level questions. In addition, the online quiz system ensures that the student does not answer their own questions. The final phase involves students taking the quiz for assessment of their topic's knowledge content.

The P2P learning tool appears to use constructivism as well as cognitivism as its foundational learning elements. Its emphasis on student-centered teaching, where the student is responsible for his own construction of the knowledge seems to be reflected well in this tool. For example, students must develop their own questions which they then submit for peer rating. In order to be able to formulate questions, students must have a deeper understanding of the subject matter. In addition, in order to be able to determine or rate the submitted questions, students must also show a deeper understanding of the subject matter. It has been said that the best way to ensure that you understand a topic is to try to teach it to someone else. In order to do this, one needs to be able to formulate questions.

According to Hoy et al (2013), constructivists argue that learning needs to be looked at from the student’s perspective. Thus if the questions are coming from the students, then they are the ones asking the questions which they find pertinent to their learning process. This is another indication of how this tool is based in the constructivism theory of learning.

Furthermore, constructivists argued that letting students direct the questioning and discussion that takes place in the classroom would result in more meaningful learning from the students’ perspectives. In this case, the classroom may be online and the social ties necessary for learning to take place according to this view are virtual, however, the creating of the questions and the rating of each other’s work, still makes for meaningful learning for the students.

In summary, this teaching tool seems to be supported by the constructivist and cognitivist theory of learning since it allows students to direct their own learning based on their own integration of knowledge and their ability to direct the questioning.

## Results & Discussion

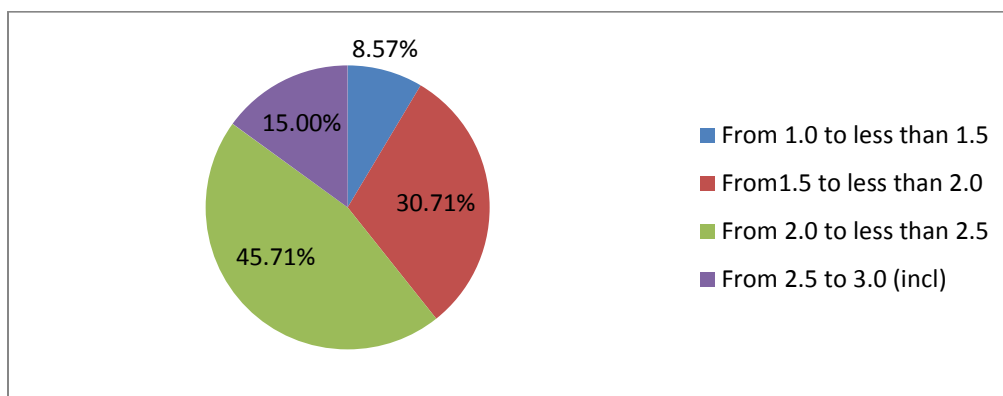
In this article, we present the results of a case where the learning tool was used during the fall semester of 2014. The results entail the outputs from each phase and some analysis of the student performance at the end. In this section, we also provide insight on more advanced analytical methods that can be done and which are not within the scope of this research.

### Characteristics of Questions Generated

The class included 15 PhD students. The students generated 140 questions and in phase 2 they were asked to assess around 25 questions making each question to be assessed by 4 students. The mean level of difficulty for each of the 140 questions has been organized in a frequency table and in a pie chart as shown in table 1 and figure 1, respectively.

**Table 1. Level of difficulty for questions generated.**

	Frequency
From 1.0 to less than 1.5	8.57%
From 1.5 to less than 2.0	30.71%
From 2.0 to less than 2.5	45.71%
From 2.5 to 3.0 (incl)	15.00%
Mean difficulty	1.96
Standard deviation	0.41
Number of questions	140



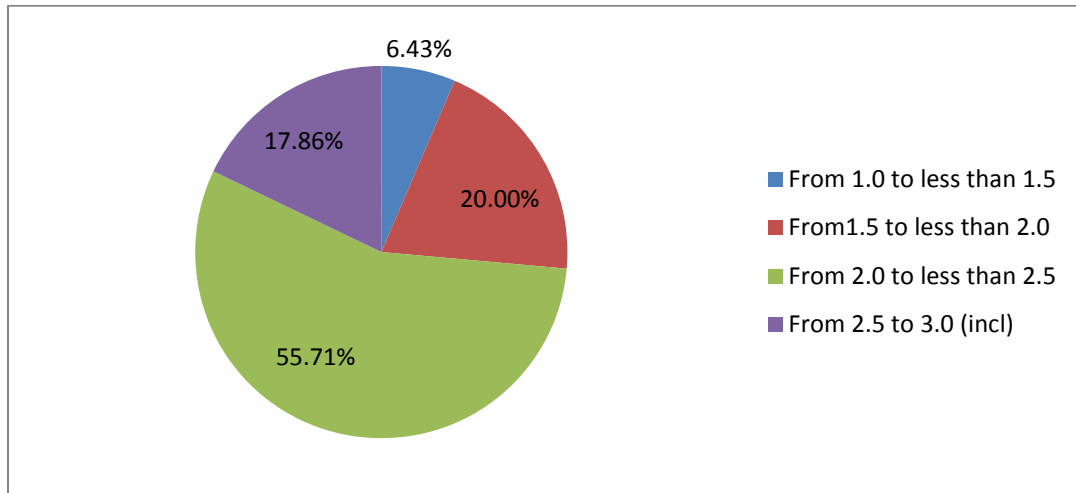
**Figure 1. Frequency of levels of difficulty ratings.**

We note that the mean level of difficulty is 1.96 with a standard deviation of 0.41. The modal class is the level from 2.0 to less than 2.5 with a 45.71% frequency.

Table 2 and figure 2 present the frequency of quality ratings of the 140 questions. We note that the mean level of quality is 2.05 with a standard deviation of 0.38. The modal class is the level from 2.0 to less than 2.5 with a 55.71% frequency.

**Table 2. Level of quality for questions generated**

	Frequency
From 1.0 to less than 1.5	6.43%
From 1.5 to less than 2.0	20.00%
From 2.0 to less than 2.5	55.71%%
From 2.5 to 3.0 (incl)	17.86%
Mean difficulty	2.05
St.dev.	0.38
Number of questions	140



**Figure 2. Frequency of levels of quality ratings.**

In an attempt to better understand the quality to difficulty relationship of total number of questions generated, we performed a simple correlation analysis between them. We found that the coefficient of correlation between the Level of Difficulty and the level of Quality is 0.309, which means that as the level of difficulty increases, the level of the quality of the question also increases. This is actually a desirable effect, however more studies need to be done to confirm the validity of this finding or rule out secondary perceptions effects.

**Peer Test & Results**

Table 3 presents the test generated by the professor including the aggregated quality and difficulty score. The last column to the right in table 4 represents the total number of ranking for each question (TR). All questions were ranked on quality and difficulty by 4 students. We present this table so the reader can assess the questions generated, which were not edited by the professor. The questions in table 3 are as-is. All these questions were multiple choice.

**Table 3. Test questions and associated rankings of quality, difficulty and total number of students that ranked each question (TR).**

Question	Quality	Difficulty	TR
What variable turned out to be less significant than previous research had shown?	100.00	66.67	4
The aim of the Connor et al.'s (2014) paper is to test the relationship between (select the correct two)	100.00	75.00	4
What is the strongest moderator in student academic performance?	93.33	80.00	5
Which of the following are correct statements about Western and Eastern education?	91.67	75.00	4
Which of followings is NOT the main objective in this study?	91.67	58.33	4
According to Connor et al (2014), what source influence children's learning?	91.67	91.67	4
Which three are the dimensions of ISI system?	91.67	83.33	4
According to the authors, which of these variables has received less attention in research and needs further investigation?	91.67	58.33	4
What are the 3 main domains on which students are tested?	83.33	66.67	4
What is one of the strongest moderators in students' academic performance?	83.33	75.00	4
Which of the following is not one of the 10 constructs examined?	83.33	58.33	4
Which of following variables is not the suggested to investigate in future large-scale international assessment?	83.33	75.00	4
the study concludes that learning motivation is	83.33	66.67	4
What coding system is used by Connor et al. (2014)?	83.33	75	4
Which two are parts of code-focused instruction?	83.33	66.67	4
Students showed the greatest gains in vocabulary and comprehension when	83.33	58.33	4
True or false: Connor et al.'s (2014) study furthers our understanding of which dimensions of the CLE provides better predictors of learning at the individual student level.	83.33	58.33	4
According to Li (2012), what are the emphases of Western educational system, on which Eastern educational systems have less emphasis?	83.33	66.67	4
What are some of the pitfalls of the present study that future studies should address?	83.33	75.00	4
What is the aim of investigation of this paper(Connor et al(2014)) ?	80.00	80.00	5
Which of the following is incorrect about Cohen's d?	75.00	83.33	4
Connor et al(2014) cite which paper to show that measurable variability in the effectiveness of teaching has direct implications for students' success or failure	75.00	83.33	4
Why is it possible for a student with high quality teacher not to earn desired outcome in language arts?	75.00	83.33	4
What are the sources of influence on learning in the dynamic systems framework used by Connor et al. (2014)	75.00	91.67	4



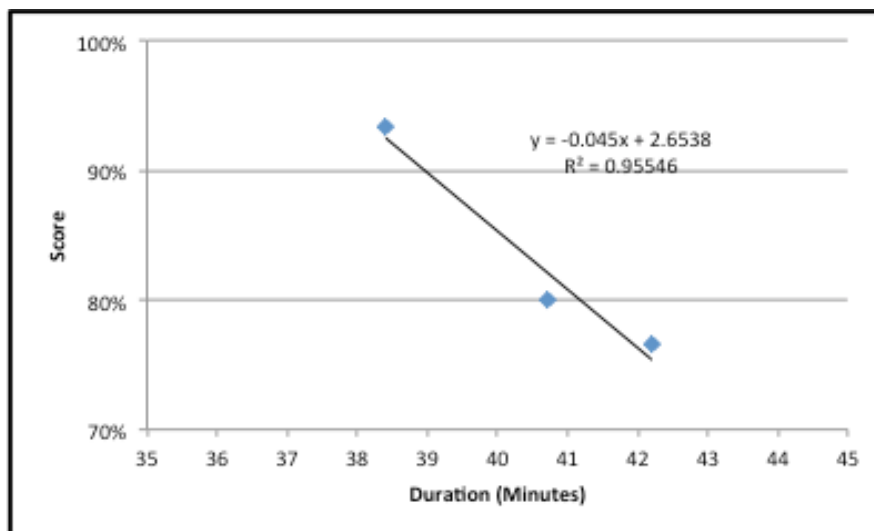
Question	Quality	Difficulty	TR
What is the central thesis proposed in Connor et al.'s (2014) article?	75.00	83.33	4
What are the big concerns of the authors regarding the education system in Asia?	75.00	91.67	4
What dimensions were the ISI/Pathway rating scale designed to rate?	73.33	93.33	5
Which of following is NOT a cautionary remarks for the paper suggested by the author?	66.67	83.33	4
Which of CLE quality or amount/content/type of instruction students received independently predicted student's vocabulary & comprehension gains?	66.67	83.33	4
What are the workshops the professors receive for their professional training (Connor et al 2014)?	66.67	83.33	4
TR: Total Rating			

Table 4 presents the results of the test showing the duration and score for each student, followed by figures 3 and 4 where we explore possible relationship between score and duration. Out of the 15 students, only 9 participated and whose results are presented. Not all students participated because as a pilot, this activity was not mandatory and in fact was setup to occur virtually and not in class.

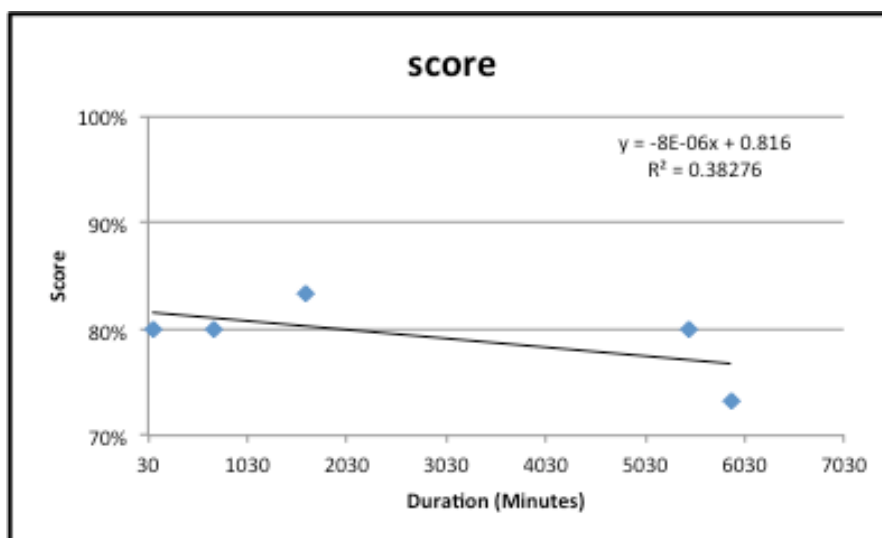
Table 4. Student test results.

Student	Duration (Min)	Duration (hrs)	Score
1	28	0.5	93.33%
2	41	0.7	80%
3	42	0.7	76.67%
4	73	1.2	80%
5	245	4.1	70%
6	695	11.6	80%
7	1614	26.9	83.33%
8	5471	91.2	80%
9	5889	98.1	73.33%

It is interesting to note that the duration for doing the test (which was open) ranged from 28 minutes to 98 hours (or 4 days). Since the test was open and the test included questions from one article in educational psychology, table 4 results provide insight on how students strategized to do the test. Those who did the test within one hour or so may have studied the article first (the professor's original intention) then simply did the test. On the other hand, students who took more time to complete the test were referring to the article as they answered each and every question. Students who did the test over a duration of days, may have done some questions, kept the screen open then came back to complete other questions. What is interesting, is that as we go down the records in table 4 from student 1 to student 9, we observe a tendency of decreasing performance. The following two figures attempt to assess that.



**Figure 3. Performance trend of type A students.**



**Figure 4. Performance trend of type B students.**

To analyze performance we split the 9 students into two groups A and B where group A (figure 3) are those who did the test within an hour implying that these student studied first then did the test; while group B (figure 4) are those that did the questions while referring to the article and where they may have stopped and came back to complete another set of questions.

Both figures clearly show that students, who take more time to complete an exam, also seem to score less. This phenomenon has been previously observed and reported. This trend is significant for group A students with  $R^2$  close to 96% (we acknowledge that 3 cases do not make a conclusion, but the results point to interesting phenomenon which begs further research). The contrary is found for group B students: The slope of the line fit (change in score with increasing duration) is not significant with  $R^2$  close to 38%. In other words, no matter how long a student keeps reviewing the article to figure out the best answer, the result or selection of the answer would be the same. This is also interesting because it alludes to the fact that the student's understanding of the article (subject matter) and synthesis of knowledge contained (in the present context of course) has plateaued. Any increase in performance would require the intervention of the professor via other activities. So for example, if this article was the discussed in class in-depth and students

were asked to take the test again, the overall performance of the group would be expected to increase.

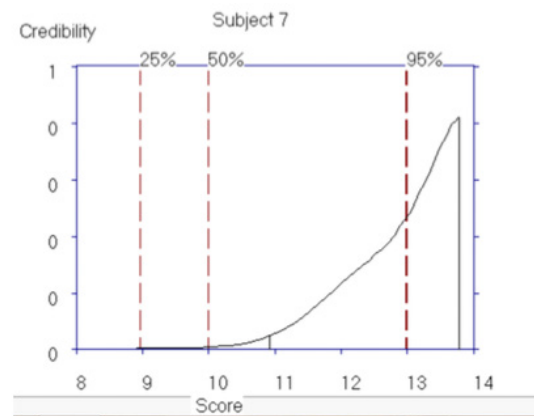
### **Item Response Theory Analysis**

Due to the context of this study, we identify the item response theory (IRT) as an appropriate method of analysis. In this sub-section, we present the results of a brief analysis of the data using the IRT, only for demonstration purposes.

The method of IRT analyzes specifically each question answered by the students, instead of looking at their particular total score to assess a student's abilities and proficiency levels. The analysis allows us to look at expected answers providing information for future examinations of the same type. In order to create results, we used Testgraf to generate responses. Testgraf is a software created by Professor Jim Ramsay from McGill University as an aid to the development, evaluation and the use of multiple-choice examinations as well as for psychological scales and questionnaires.

To illustrate the use of IRT we will look at two students. Student # 7 scored 15/18 (83.33%). Figure 5 shows the relative credibility curve of this student which illustrates their actual scores, and their expected scores. On the x-axis is the actual score of the student (vertical straight line), on the y-axis, is the credibility factor of the student, if this student were to retake another exam of the same type.

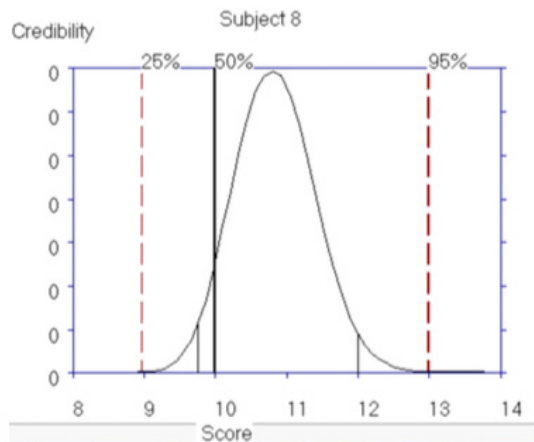
In comparison with the rest of the class, this student ranked in the higher 95% of the class. Its credibility factor also shows that if the student were to retake a test of the same type, this student's performance would range from 10 to 14. Since its maximum likelihood approaches the credibility of 1, it means this student's performance is consistent.



**Figure 5. Analysis of student 7.**

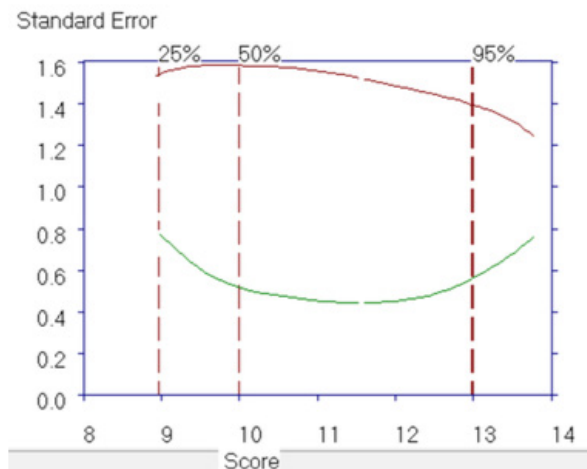
In comparison, Student # 5 scored 10/18 (70%) ranking him a little lower than 50% of the class. His expected score would range from 9 to 13, although looking at his maximum likelihood estimate of proficiency, his performance may fluctuate and show less consistency if a similar examination is taken.

Inputting the sequential question answers of the students into Testgraf, we are able to generate an analysis per question item, per student and an overview of the test performance. IRT allows test evaluators to check for discrimination within an exam, such that whether a question is differentiating a strong student from the weaker students and whether the questions are balanced in terms of difficulty level.



**Figure 6. Analysis of student 8.**

Figure 7 shows an overview of the standard error between right (green line) and wrong (red line) answers. A large fluctuation (variation) exists for students who scored in the 50<sup>th</sup> to 85<sup>th</sup> percentile, meaning their wrong answers were not always the same. While students who scored in the 95<sup>th</sup> and up or 25<sup>th</sup> percentile and lower have a lower fluctuation in their scores. In other words, for students who excel or do poorly, their performance is constant with low variations.



**Figure 7. Standard error between right and wrong.**

## Future Research & Conclusions

Throughout the literature, immersive learning showcases many advantages to improve current learning, not only do virtual realities allow possibilities of visualizing environment that a human cannot see in real life, virtual realities creates an interactive nature which allows knowledge to be spread quickly, effectively and globally. Through the four dimensions of the teaching process (context setting, class preparation, class delivery and continuous improvement) and the three styles of learning (Experiential, Constructivist, Collaborative), these elements all contribute into the use of virtual realities as tools to utilize immersive learning as an upcoming, important learning style. In this proposal, as the literature on immersive learning is still at its beginning, many perspectives can be explored as we suggest further investigation into the use of human senses such as tactile, olfactory, auditory, visual and gustatory as an integration to creating immersive learning styles.

At the moment, virtual realities only touch on tactile, auditory and visual senses, however, based on branding literature and psychology research of senses, olfactory is one of the most powerful senses in creating memories (Anggie and Haryanto 2011) at the conscious and unconscious level. The olfactory sense combined with all four senses creates an experience for students to immerse into a learning environment. In addition, gustatory sense compliments all other senses as the smell influences the taste perception (Krishna, Morrin, and Sayin 2014), which in turn influences the perception of an object, an environment and a product. To support this proposition, Summers, Reiff and Weber (2008) have shown the relevance of using more modalities in learning styles, do make the process more effective.

While Nokia has presented a multi-sensory communications devices (Hultén 2011), similar branding strategies can be created towards education as the cognitive, behavioral processes are the same in gaining attention, creating retention. The popularity and necessity of virtual realities will become the default method for representing problems (Jonassen 1999). This invention, with multiple assets such as having a collaborative, interactive nature can be enhanced to multiple modalities, multi-sensory learning styles. This platform also adds freedom and decision making potential (Darvasi 2008), representation of both abstract and concepts material, while allowing individuals to have a presences (Dickey 2003) in a world they could have never imagined existed in a cost effective, high quality and motivating environment.

In the present study, we aimed at creating an innovative pedagogical method that utilizes IT and the web to help engage students in different ways. The resulting P2P learning tool design process can be linked to the constructivist and cognitivist approaches and provides a wide range of learning opportunities by changing the configuration setup. Through these combinations, the tool allows students to be immersed in the activity of capturing and synthesizing relevant information.

We presented herein a pilot study using the P2P learning tool and executed in a PhD class. The results were interesting as they revealed a number of insights namely:

- That students engaged with each other (~constructivism)
- That students engaged with subject matter (~cognitivism)
- That spending more time on a test is not a guarantee to perform better
- The P2P learning tool
  - can be very effective
  - has an immersive learning element in its design and process
  - can be utilized for learning and assessment at the same time

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## Immersive Interactive Learning Environments

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## Biography



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