

# **Spectrum -- Online Educational Tool for Teachers**

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## **ABSTRACT**

This research aims to create educational teacher training through animated case studies and interactive tutorials. The College of Education has classes to teach classroom management, but most teachers do not have formal classroom management training. Thus, the goals of this research are to provide an online educational tool for educators to learn how to address and react to challenges that occur in the classroom. Spectrum provides a database of animated web tutorials as an extra resource to teachers. Each tutorial is taught through a three-part interactive case study encompassing an animated video, background text and a reflection & discussion section. These cases studies cover topics within general life and science cases. Spectrum has implemented a responsive design allowing for easy accessibility amongst mobile and desktop users. We believe that this cross platform design can enhance future testing and surveying, to observe how teachers prefer to use the tool. As our database expands, Spectrum will help teachers control the classroom and have the proper knowledge to do so.

## **1. INTRODUCTION**

As an educator, each year or semester challenges arrive in the classroom. Maintaining student cooperation throughout each lesson can become difficult if the teacher is without classroom management knowledge and skills. Currently, the best way to obtain this knowledge is through personal experience. These challenges can vary and are not the same in every classroom. There are, however, many cases or situations that commonly occur. Cotazzi believes that teachers' knowledge is contextual and event structured. Thus, teachers' classroom management strategies and disciplinary actions are based on specific events they have experienced [1]. Adequate training is required to prepare teachers and one classroom experience will not prepare teachers for the future situations that will occur in the classroom.

The problem arises when considering how to incorporate this knowledge into teacher training. In a proactive effort, Spectrum plans to remove the trial and error method of learning, which does not teach proper classroom management habits. For the purpose of providing a straightforward tool for teachers, this research uses various animated scenarios as web tutorials to train teachers and give them the knowledge to properly run their classroom. In addition to the animated videos, the Spectrum tool complements the animated tutorials with a reflection and discussion section. This reflection section is used to check and the users knowledge and makes sure that they understand how to react to situations and if the teacher would make the correct decision virtually before having encountered the situation in the classroom. The reflection section also gives feedback to the user so they will understand why the answers are correct and others are incorrect. Using scenario narratives, the tool will aid teachers with proper solutions to manage difficult situations in the classroom.

Spectrum's main aim is to bring together teachers to maximize the impact on the teachers learning, creativity, and behavior through animation. This tool will assist teachers in gaining the necessary knowledge to manage different situations teachers are likely to encounter in the classroom. There are different techniques used to create animation such as cut out animation, drawn animation, pixilation, and blue screen animation. Animation is a clear means to illustrate a scene or video. We believe that it is the most efficient method to provide a video to complement these cases.

Early emphasis of Human Computer Interface (HCI) has been to design and implement interfaces for high usability. While satisfying the need for usability, a clear-cut aesthetic appeal of interfaces is now a critical added requirement for commercial success. An interface is a choice of technical hardware or software of a given interaction model.

Researchers are looking more and more towards enabling touch-based interactive educational apps that may increase student success. Most students have their own device, such as a smartphone or tablet. If not, the cost is no longer prohibitive. Therefore, these devices can be used to enable personalized learning. Since the devices are mobile, they enable situated learning from basically anywhere, the classroom, the laboratory, field trips, and in the home. Research shows that little hands surprisingly activate interactors on mobile touchscreen devices. It also shows that children have difficulty maintaining a connection with touchscreens to effectively complete drag-and-drop interactions. Therefore, touch-based interaction devices should be designed for individuals of varying physical and cognitive developmental levels [2].

This research aims to train teachers' classroom management skills and knowledge, and also expand the amount of resources available for teachers to gain the core knowledge for classroom management. The Spectrum Educational Tool will have a tri-part lesson with text, video, and a reflection & discussion section to educate the teachers case-by-case. The goals of this research is to construct and test this educational tool to see if its' content can help indoctrinate the fundamental classroom management principles for teachers to correctly manage the classroom when these situations occur.

## **2. BACKGROUND**

Other e-learning studies and articles have shown the positive effects from different tutorial services. A great advantage of these services is that it offers the opportunity to bring technology into the classroom. Mobile devices have been used more frequently and providing educational tools through these devices can enhance learning in the classroom. Optimizing technology such as tablets and mobile phones to use web applications or mobile applications to learn can engage the classroom. As education attempts to teach students through current technology, Spectrum plans to be a mobile resource for teachers to use.

Researchers have explained the depths of educational learning barriers, especially, in classrooms. A major learning barrier is the complexity that applications such as videogames introduce into the students learning process. School and Universities will not have an easy transition to have the proper equipment to facilitate a smooth learning environment. Torrente tested the <e-Adventure> platform, which is based off of a point-and-click system. The point-and-click graphical interface is a game where the player interacts with the game's objects and environment through an on-screen cursor [3]. The <e-Adventure> platform allows for installation, distribution, and platform-dependency issues to become resolved. He focused on understanding all of the boundaries that are preventing educational games to become relevant more than proposing a specific solution. He discussed the usage of an <e-adventure> platform, and how it's easily delivered to the students without requiring additional installation and deployment efforts. <e-Adventure> also facilitates the integration of the games with other LOs containing web-based content. Although Torrente studies the pros and cons behind the <e-Adventure> platform, he still does not suggest this as the quintessential solution for educational gaming. His work discusses how this system can help avoid many issues that occur when distributing applications to students.

Concurrently, Papastergiou's educational gaming study consisted of two high school student groups, a gaming group and a non-gaming group. The objective of his study was to access the effectiveness and motivational interest of a computer game for computer memory concepts amongst high school students [4]. His design had one condition – to be able to run on outdated machines in computer laboratories. His approach is useful because most schools do not have resources to fund a new computer laboratory. The two test groups took a pre and post-test, the Computer Memory Knowledge Test (CMKT). There was no difference in the result in the pre-test; however, in the post test there was a major difference in the results. The test showed that learning effectiveness on computer memory through gaming was a better approach compared to the non-gaming approach. This research shows how technology can provide positive results in the classroom by providing virtual learning in spite of the conventional learning using white boards, pencil, and paper. From Papastergiou's research, we learn how an interactive user face can increase student performance.

The aforementioned technology has been created with a single user interface, meaning that for every device there is only one user. Tewissen's collaborative research, however, looks at the potential success that multi-interfaced collaborative writing technologies can have on young students [5]. He used first grade students to test the writing application. His findings were mostly observations and evaluations of students using specific writing task. His technologies teaches students in pairs, which he discovered that the collaborative aspect was a motivating feature for the first grade students. In addition to this motivation, the weaker students were also able to benefit from working with partners, especially others with stronger writing skills. Despite the difficulty level of the technologies content, the students refrained from using the teacher's help. In comparison to the Reading through Writing alternative of learning, the collaborative writing method proved that a computer-integrated classroom could be an effective collaborative method for learning. The power of learning in pairs added value and motivation. Although Spectrum is not necessarily collaborative tool, this research expands the barriers of Spectrum's design and allows us to consider more options for its usability and testing.

Researchers have been able to test software, but Chin uses the Questionnaire for User Interface Satisfaction (QUIS) to assess user's acceptance of a standard command line system and a menu driven application [6]. His focus was to evaluate software and develop a premier software evaluation tool. The scientists in this study recognized the unfamiliarity among users with these different systems so they also asked the participants to evaluate software that they liked and disliked. The questionnaire continues to develop as the scientists continued to make newer versions. In the earlier versions there were 90 questions and a rating scale from one to ten. In the newest QUIS tool, version 5.0, there are less than 30 questions and a rating scale from one to nine. The scientist did a good job of comparing the 3.0, 4.0, and 5.0 versions. As Chin's versions were updated, he found small design aspects that impacted the effectiveness of the questionnaire. The updates made sense and also helped users give a better assessment and convey their opinions clearly. Researchers are still seeking methods to upgrade the survey, by moving from the pen and pencil assessment to a computerized IBM PC version to better facilitate the customization of questions for particular systems. Similarly in education, classrooms have begun to make use of computers in the classroom, but with recent advancements in technology, mobile devices are slowly becoming incorporated into the classroom. Thus, this is where we saw a need for mobile capabilities and possibility a use for user satisfaction testing.

Wilson tested the attitude towards an e-learning online tool and from the feedback tested their rheumatology tool [7]. The participants in the study were split into two groups, the undergraduate group and the non-undergraduate group. The non-undergraduate group consisted of post-graduates and health care professionals; therefore both groups consisted of adults. The researcher chose to use an online tool because he believes that computers are intrinsically interactive and would be good to help facilitate the move away from passive learning in the medical curriculum. The article suggests using case studies to help aid the students become independent learners and problem solvers instead of the rote memorization and lecture methods. The 30 case studies are used to help strengthen the medical students factual knowledge base by moving to a teaching style geared towards decision analysis curriculum. The participants of the tool were students and felt as if the online tool is a useful supplement to compliment their other resources. Based on the student's comments, they expected to have a range of tool available for them to use, which gives students different scenarios and examples on the different concepts. From reviewing this research the change to a decision analysis style course helps the Spectrum tool have a design challenging enough to teachers decisions in different situations.

### 3. IMPLEMENTATION

The Spectrum Online Tool is a web-based application. The major piece of the site is the case studies incorporated throughout the site. The Spectrum tool is a responsive website (i.e. can be used on both laptops and mobile devices) coded in HTML5, CSS3, and PHP. The newest case study videos were made using the 2015 version of GoAnimate. Others were done in previous versions of GoAnimate. We designed an online educational application in order to assist new and experienced teachers in gaining the knowledge they need to manage classroom situations.

Spectrum covers a number of scenarios to teach and train teachers to know the proper actions and re-actions for these classroom environments. Figure 1 displays the home page of the Spectrum Educational Tool, which focuses on providing foundational

information about the Spectrum and navigation links to three categories that house our case pages. The initial version of Spectrum, shown in Figure 1, was created to immediately provide links to all of the Spectrum cases to users. Each case has three components background text, animated video, and a link to the reflection section.

Spectrum has moved to a responsive design, see Figure 2, for the purpose of having mobile functionalities. This design is to make Spectrum readily available at any time. The goal here is to not to

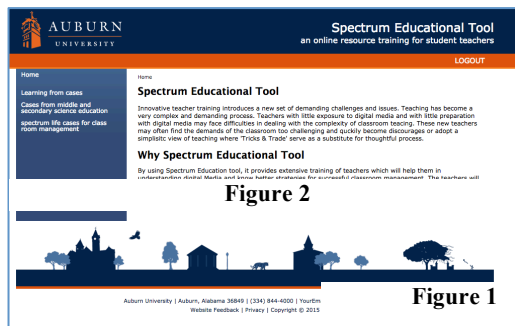


Figure 2

Figure 1

have teachers use the tool in these situations, but to allow users to use the tool in the most efficient way for a user to learn comfortably.

The Spectrum Educational Tool is created around animated case studies. These case studies are used to visualize the situation and provide narration of the classroom environment. One of the most recent case study additions is the Laura Conway case. This case deals with a learning disabled student Mike Abbott, who is about to enter into the sixth grade. The problem occurred when Ms. Conway began to read Mike's autobiography. She has taught Mike for the past three years. Her support has helped Mike get rid of his poor habits in school. Initially, Mike did not like the resource room and he hated going there because he would miss science experiments and art activities when he left. Ms. Conway has helped him have more of a desire to learn, and it has affected Mike's aptitude towards school. As Ms. Conway was reading his autobiography she reflected on the past three years and she began to worry about Mike. The sixth grade teacher is very impatient and would not give Mike the support he would need to continue to succeed in the classroom next year. Ms. Conway began to think and reflect on whether or not she should talk to Mike about this situation or not. She believed that it could go wrong if she spoke to him about it and if she did not say anything, she would have guilt of not helping when she had the opportunity. These thoughts began to overwhelm her and lead her to read Mike's autobiography again.

This scenario gives an example of advising students correctly. The animation will have four main scenes. The first would be in Ms. Conway's classroom as she reads his autobiography. The second will transition into a scene of Mike getting pulled from his class in order to go to the resource room to receive extra help. The third scene will be of the resource room with Mike and other students

learning. Lastly, the fourth scene is of Ms. Conway thinking and reflecting, which leads her to read Mike's autobiography again. This scenario will be implemented in to the Spectrum site through the 2015 version of GoAnimate. GoAnimate has a text-to-speech narration feature, and video editing capabilities, which has allowed us to create these animated videos.

## 4. CONCLUSION

Today's mobile devices are able to function on a similar scale as computers and laptops. Thus, it is important to have mobile friendly applications for these devices. The focus of this research has been to create an online educational for teachers. The tool was created through a website with responsive capabilities – meaning that the site can be used on phones and tablets, in addition to computers. Using this responsive design, we are able to produce a versatile instrument that can be functional despite users platform preferences.

## 5. FUTURE WORK

In the future, we would like to continue to grow Spectrum's database of cases by creating various lessons to teach general classroom management for teachers. These lessons would add value by helping teachers refresh each year and also for newer teachers to use as they begin to adjust to the role of a teacher.

If the Spectrum Educational Tool receives positive feedback and can prove that its functionalities are effective, a transition to a mobile application for mobile devices may be appropriate. In this scenario, we would focus on providing the entire Spectrum tool to have all capabilities on the mobile applications as an alternative to using the web application currently in existence.

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