

Undergraduate Thesis Prospectus

**Supplementary Online Learning Tools and Course Gamification**

(technical research project in Computer Science)

**Disciplined Conformity or Free Expression: School Apparel Policy in the United States**

(STS research project)

by

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October 31, 2019

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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## **General research problem**

*How can the United States public education system be improved?*

Education is a foundation of success. As Arthur Camins writes, “education should prepare young people for life, work and citizenship” (2015). According to the Bureau of Labor Statistics (BLS), high school dropouts make \$520 a week on average (Torpey, 2018). In contrast, a high school diploma and bachelor’s degree raise that median to \$710 and \$1170 respectively. A college degree halves the chance of unemployment (BLS, 2019). However, only 33% of business leaders agree that college graduates have the skills required for the workforce (Lumina Foundation, 2014). Continuous improvement of the public education system will better prepare our nation’s youth for social and material success.

## **A Gamified Course Visualization, Organization, and Assessment System**

Mark Floryan, a Computer Science professor at the University of Virginia, is dissatisfied with the way classes are currently taught. Floryan believes that strict deadlines and one-time assessments are not optimal for learning. Floryan seeks to understand the efficacy of gamification as an alternative method for learning. In his proposed system, students advance through a course as they advance through a video game: at their own pace, with deliberate practice and immediate feedback. Course material will be organized by topic, allowing for class progress to be visualized as a graph. Professors and students alike can see their progress in real time with on-site quizzes and automated grading.

Many classrooms today use the lecture-based exam model. In this model, lectures are the foundation of the course; quizzes, homework, and exams are all contingent on the lecture material. This solution forces students to learn at a controlled pace outside of the classroom,

often causing students to move on from a topic before they have mastered it. Floryan's system aims to allow students to work at their own pace outside of the classroom and to make the mastery of a topic feel like beating a difficult boss in a video game.

Requirements are important because they enable clients to express their desires in a clear and unambiguous way. By converting client wishes to requirements and reviewing those requirements with customers, software developers can confirm that the product they will create matches the client's needs.

In the previous academic year, this project was started by a different team under the original set of requirements. Our contribution to the system includes adding security and authentication, improving performance at scale, aligning the system with Floryan's course, and adding quizzes and auto-grading. Based on several meetings with Floryan, we assembled this list of requirements for our contribution.

**Minimum Requirements:**

- The system must secure student data and grades such that they are only accessible by that student and by the course staff
- As a professor, I want students to only be able to see course topics that have been unlocked
- As a professor, I want to be able to lock and unlock topics from within the client
- As a professor, I want the students to be able to see their grade for level of competency per topic
- As a professor, I want to be able to upload grades in csv format
- As a professor, I want to be able to upload large amounts of data quickly (50,000 instances)
- As a user, I want the system front end to not experience notable lag when the database contains large amounts of data

**Desired Requirements:**

- As a TA, I want to be able to access and modify student grades from the frontend
- The system must be secure at the network level by encrypting traffic with HTTPS
- As a professor, I want the system to be able to store arbitrary assignment grades associated with a topic
- As a professor, I want to be able to toggle between cutoff grades and percentile grades per course and per topic
- As a professor, I want to be able to customize the thresholds for cutoff grades per the course and per topic
- As a professor, I want to be able to import grades from Bloomfield's new 2150 system
- As a professor, I want to be able to administer multiple choice questions

<ul style="list-style-type: none"> <li>• As a professor, I want to be able to auto grade quiz submissions and provide immediate feedback</li> <li>• As a professor, I want to be able to administer parson's problem questions</li> <li>• As a professor, I want to be able to create quizzes from a question bank and to specify how the quizzes are to be generated</li> <li>• As a professor, I want to be able to administer short answer questions</li> <li>• As a staff member, I want to be able to grade short answer questions</li> </ul>
<p><b>Optional Requirements</b></p> <ul style="list-style-type: none"> <li>• As a professor, I want to be able to administer short answer questions</li> <li>• As a staff member, I want to be able to grade short answer questions</li> <li>• As a professor, I want to be able to administer and grade coding questions</li> </ul>

Figure 1.

## **Disciplined Conformity or Free Expression: School Apparel Policy in the United States**

*How are students, parents, school administrators, manufacturers, and civil libertarians competing to influence school apparel policies in the United States?*

Children go to school every day to learn and grow, both as students and as people. Society should do the best it can to promote a productive environment where students feel comfortable and safe. Because the clothing children wear inherently affects their sense of belonging and their self-expression, decisions regarding school attire should be guided by students' interests. According to the Pew Research Center, 29% of teens feel pressure to look good and 28% feel pressure to fit in socially (2019). Education Week Research Center found that 80% of educators strongly agree that students need to believe they belong in the classroom community to be successful (Blad, 2017). It is therefore worth looking into the motivations and arguments of the various groups that compete to influence these policies.

Researchers disagree about attire policy and its effects. Baumann and Krskova (2016) studied the academic performance of 15-year-olds in five regions. They found indicators that “for countries where students wear school uniforms...students listen significantly better, there

are lower noise levels, and lower teaching waiting times with classes starting on time.” However, Brunσμα and Rockquemore (1998) studied U.S. 10<sup>th</sup>-grade students, finding no evidence that school uniforms reduced absenteeism, behavior problems, or substance abuse. In 2016, 21% of public schools required students to wear uniforms (NCES, 2019).

The primary participants are students. Generally, most disapprove of school uniforms and strict dress codes. About 70% of students in Volusia County, Florida, voted against requiring them in 2015 (Chavez). Students opposed to school uniforms also tend to be more vocal. The interests of many students are represented by youth advocacy groups, such as the National Youth Rights Association (NYRA), which opposes uniforms and dress codes on the basis of freedom of expression (Mandal, 2017).

Other advocacy groups include the American Civil Liberties Union (ACLU). The ACLU does not directly oppose dress codes and uniforms, but it defends students’ civil liberties, especially in matters concerning gender and race. ACLU of California’s “My School, My Rights” campaign informs students of their rights to choose their attire (2019).

Parents Across America (PAA) is a non-partisan grassroots organization for US parents advocating to improve public schools. While divided over uniforms’ effects, they express concerns of discrimination. Kimberly Books, leader of PAA chapter PAA-Atlanta Public Schools, argues that any attire policy should be applied fairly and uniformly across schools and districts (2015).

School administrators draft and enforce dress codes. The National Association of Elementary School Principals, a professional society, favors school uniforms, arguing that “a school uniform policy can help reduce instances of classroom discipline and bullying, as well as improve student safety and attendance” (2013).

Feminist have criticized dress codes they consider discriminatory. The Oregon branch of the National Organization for Women (NOW) developed guidelines, adopted by Portland Public Schools, that removes sexist rules and terms from dress codes. NOW promotes this model as an alternative to traditional attire policy (2018).

Uniform manufacturers have a vested interest in attire policy, as it directly affects their profits. DENNIS Uniforms, a school uniform manufacturer based in Oregon, lauds the benefits of uniforms on their website, claiming that “with a uniform program, schools eliminate the socioeconomic tension driven by fashion trends and high-end brands only some families can afford, while increasing safety on campus and distinguishing students within their community” (2019).

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