

Project Spark

Findings and Framework

A study in bringing Informatics to the high school setting

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Abstract

Students are not being exposed to the topics of Informatics in high school. We have found that many currently in the field did not discover such topics until their second year in college. With the demand for user focused critical thinking on the rise, Project Spark hopes to bridge the gap by introducing these topics earlier in the education system in order to spark interest. We brought college students to the high school classroom in order to give high school students a taste of what they can do with user-centered design. Our goal was and is to simply get more students interested in design thinking within the context of technology in the information age.

To gain an insight for what sparked interest in the topic, we visited three high schools in the Greater Seattle Area, each with a unique demographic and taught about Informatics. At two of the schools, we specifically taught User-Centered Design, while at the other we led a general information sessions on Informatics. Our aim was to discover how to best present the field to high school students so that they would be learn about it and become interested in before they reached college.

Our findings show that, while our intervention could have been more effective from a delivery standpoint, there were about a third of students experienced a positive change in their desire to learn more about informatics. As well, 1 in 4 would consider doing informatics as a job. Additional findings are detailed further in this document.

Based on our findings, we have developed a framework that allows others to continue on where we left off. Our framework is broken up into three parts: information about our pilot classes, overall findings based on these pilots, and recommendations based on these findings. Within our recommendations, we split them up to cater toward three separate audiences: high school administrators, college or higher education administrators, and community members / general public.

Purpose

Our purpose behind our study is to provide insight into how to spark interest of a high school student in the field of informatics. A secondary purpose is to discover if high schools are interested in bringing the topic into relevancy within their curriculums/programs. Our purpose with this framework is an attempt to take what we have done and transpose it to a document that will allow others to continue where we left off. We hope that people will see, from our shortcomings and successes, how the better implement bringing informatics into high schools.

Pilot Classes

For our study, we decided to teach pilot classes of informatics materials within high schools in the greater seattle area. We sought out to have real experiences shape our recommendations instead of hypothetical scenarios dictate how someone should continue.

We successfully secured four pilot classes in two different school, each with highly differing demographics.

Locations

Both School A (as it will be referred to in the entirety of this document due to regulations) and School B were located in the Greater Seattle Area.

Demographics

School A is a school of students under 1000. They are a very ethnically diverse school with a majority percentage living in poverty. Graduation rates are on the rise, but some standards still fall short of the statewide averages.

School B is a school of students of 1500. They are also ethnically diverse, but still have a majority white student representation. It has been rated one of the top schools in the state and nation. Income levels are higher than average.

Methodologies

Our methodologies were based on research we conducted about the best ways to teach User Centered Design. We also adapted much material from the coursework we had taken part in at the UW Information School. Our methodologies were tested in small group settings as well as vetted by professors at our school to bring about refinement and clarity.

We taught as a group of four, partially in lecture style, but mostly in group discussions. Our focus was to get the students engaged in thinking about User Centered Design instead of just telling them about it. We broke up into small groups within classes, where each teacher led discussions about the topic and how it applied to their life. Eventually, we then brought the students, in small groups, through the design process, either designing solutions to existing problems or new features that could add value to the existing design.

Overall Findings

Statistics

- 10 out of 32 students had a positive change in their desire to learn informatics
- 18 out of 32 students felt they learned more about informatics after our teaching
- 1 in 4 students said they would be interested in doing informatics as a job in the future
- 3 teachers (2 from School B, 1 from School A) “sat-in” while we taught our class. A follow up interview revealed that all 3 would be interested in continuing efforts to bring informatics into their high school.
- For a Computer Science related class at School A:
 - 25% said they could see themselves getting a job doing something like User Centered Design (UCD) and 17% said they could see themselves getting a job doing something like informatics
- For an AP Computer Science class at School A:
 - 33% said they'd like to learn more about UCD
 - 28% said they could see themselves getting a job relating to UCD
 - 43% said they'd like to learn more about Informatics
 - 43% said they could see themselves getting a job relating to Informatics

Additional Findings

- It is unwise to make any assumptions about the students you are going to teach. We assumed that each student would have used Snapchat upon going into School A, but found that only a few had actually used it, rendering our teaching less effective.
- Group teaching is an effective method that allows individuals to feed off each other's input, ultimately providing the best sculpted delivery to students who understand things in different ways.
- Each student group is different. We found drastically different types of students from class to class and school to school, requiring us to custom tailor the way we presented it based on the student. You have to be dynamic with your structure.
- Certain students at School B did not feel challenged enough by some of the topics and activities presented.
- Upon meeting with principals and administrators, we found that they wanted more from us than we could actually offer. At first, we thought it was going to be difficult to find ways into high schools, but actually found out that they wanted much more than we expected. This means that future partnerships in bringing Informatics to high schools is a high potential.

Recommendations

Our recommendations, while by no means perfect, illustrate the process we went through for the entirety of attempting to set up our study. They are listed below and broken into separate audiences depending on who is attempting to continue working toward bring informatics to high schools.

Common Areas of Concern

There are certain areas of concern that are shared across each target audience with this framework. These are items that must be considered regardless of what you plan to do with this document.

Curriculum Building

Our Experience

This took most of our time to try and properly configure. This is the cornerstone of the whole operation. How you interact is equally important if not more than what you teach. We were led to believe by experts in the field of pedagogy, our professors, advisors, and principals, that teaching method is incredibly important. So we aggregated data and tested on four different teaching methods: Interactive Demonstration, Gamified Learning, Immersion, Small Group Learning. Through these investigations we found that there might a be link in interest in the class and subject matter, our curriculum drafts can be found below. So we had to decide what subject to teach. This was decided upon based upon an analysis of our major. It was determined that user-centered design was the core of our major and thus it was the topic that should be taught. We also thought that students would generally not have heard of it and thus it would be easier to determine if our intervention did anything.

Recommendations

- Go through a curriculum design draft process and explore different teaching methods (the method is described in the bullets after this
- Determine specific design considerations to address for each draft. These are the ones we chose:
 - What overall vibe are we going for?
 - How do we want to deliver the material?
 - What is our goal with this teaching method?
 - What kind of teacher do we want?
 - What kind of setting do we desire?
 - What kind of students do we attract?
 - What resources do we need to present?
 - What should the classroom shape be?

- What additional help do we need for our method?
- What are some notable examples of this teaching style out there?
 - What are some problems that might arise with this teaching method?
 - What are some key factors that need to be kept in mind to make this method effective?
- What are the metrics for determining the success / effectiveness of this method?
- Create curriculum drafts for the chosen teaching methods and subjects (*See Example Curriculum Draft in the Appendix*).
- Think about possible scenarios that you might have to prepare for:
 - One student dominates the discussion
 - Make sure to equitably spread the time by giving structure to how the discussion will go i.e. someone goes then the person on their left goes etc.
 - Silence engulfs the group
 - Response immediately move to the next activity or ask another question
 - A student does not see the importance of the topic
 - try to bring the subject closer to them by asking them about problems in their own lives
 - Use examples from their own lives
 - A student is distracting another student
 - ignore it and keep going
 - Deal with it by talking to the student to get more involved or ask them a question
 - I disagree with one of the students' responses.
 - Either I actually disagree with it philosophically or I think that it is irrelevant to the subject
 - In response maybe ask the student to reframe the response or reframe it for them to give an example of a proper response
- Take observations about usability of the different teaching methods used with each subject and use those to inform decisions on which methods to use going forward with the different subjects
- After deliberating pick the subjects and teaching method pairs that seem the most successful together and create a final curriculum (*See Example Final Curriculum in the Appendix*).
- Employ curriculum in the classroom and enjoy

Creating times for the program

Our Experience

We went to the high schools during the day when our schedules would allow it. However the original intention was to go after school as to not interrupt the flow of a normal school day or allow the bureaucracy of education to bog the program down.

Recommendation

The time you be able to go will likely depend on the number of college students that you have at your disposal. Try to keep the time consistent each week and allow your students to dictate when is best for them.

For High School Administrators

Initializing

1. Check Student Interest in Informatics or similar programs

Our Experience

This is something we never really had to do, we conducted a survey that asked if students in our major would have wanted to discover our major sooner and (Some percentage) said yes. We were working from the assumption that the students at these high schools would have some interest in the program or subjects of Informatics. If they did not then we could spark an interest in them. However this is relevant for a high school administrator because there is much less motivation to bring a program like this to their school if their students have little to no interest.

Recommendation

Gather the student's interest through an easy to fill out survey. Marking down even the slightest interest in the subject matter as a yes, because the program is meant to foster and nurture interest.

2. Next get in contact with administrators at a local University

Our Experience

For our team it was easy as walking down the hall to talk to our administrative staff. This is not something that will be reflected in the experience of many high school administrators.

Recommendation

Call to make a personal connection with the higher education administrator in the program you are interested in making the connection with. Then just talk to them about a program like Spark. Ask the Higher Education Admins numbers on interested college students to come and teach. Ask the college admin about times the College students can come. Then set meeting times.

3. Curriculum Building

Check the Common Areas of Concern under the heading Curriculum Building

4. Create times for the after school program

Check the Common Areas of Concern under the heading Creating times for the program

5. Observe and Participate in the first class and enjoy

For Higher Education Administrators

Initializing

- Check if your students have an interest in teaching their major's ideas to high schools students

Our Experience

We never had to do this, because we were interested in teaching. However we spoke we quite a few of our peers and their interest was nearly unanimous.

Recommendation

Make an easy five question survey to gauge interest:

- What is your name?
 - Would you like to go to high schools and teach about (insert program/ major name here) ?
 - How many hours would you be available per week?
 - What times would you be available?
 - Demographic Section
- Contact Local High School Administrators

Our Experience

This was particularly easy for us, because we just graduated high school not long ago and still felt affiliated with the schools that we contacted. However we contacted two high schools which none of the team attended and received positive feedback, there was only one out of the four schools contacted that responded negatively. We simply emailed principals and other school board administrators asking if we could come in to teach about Informatics. The demand for college students coming back was so incredibly high, we could not meet it.

Recommendation

Either call or email local administrators with the information about the number of college students interested in the program and ask if they would like to participate in a program like this. Ask them to find out if their students are interested and get back to you.

- (Assuming a positive response from at least one high school) Start Curriculum Building

Check the Common Areas of Concern under the heading Curriculum Building

- Survey your students for times in which they are available

Our Experience

This is not something we had to do, because we just fit our schedules around the pilot classes at each high school. However a quick survey is an easy way to get time availabilities for a wide number of people.

Recommendation

Make a quick survey asking:

- ☐ What is your name? (Probably necessary if you want to pick specific students for the program)
- ☐ What days are you available?
- ☐ What times on each day are you available on?

- Make a committee to train students how to teach

Our Experience

We went through an odyssey learning from different professors that we thought taught well and other education veterans, at the different high schools.

Recommendation

To ease this process of trying to figure out how to teach make a committee of qualified professors to help teach your students how to teach properly. In addition including some of the high school teachers and principals will allow the students to get better perspectives on how messages and curriculums should be tailored to each high school. As the years progress this type of committee can be handed over to students who are veterans in the program.

- Create the official times for the program meetings during the week

Check the Common Areas of Concern under the heading Creating times for the program

- Observe the program and enjoy

For Community Members / General Public

Initializing

- Contact Local High School Administrators

Our Experience

This was particularly easy for us, because we just graduated high school not long ago and still felt affiliated with the schools that we contacted. However we contacted two high schools which none of the team attended and received positive feedback, there was only one out of the four schools contacted that responded negatively. We simply emailed principals and other school board administrators asking if we could come in to teach about Informatics. The demand for college students coming back was so incredibly high, we could not meet it.

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- Next get in contact with administrators at a local University

Our Experience

For our team it was easy as walking down the hall to talk to our administrative staff. This is not something that will be reflected in the experience of many high school administrators.

Recommendation

Call to make a personal connection with the higher education administrator in the program you are interested in making the connection with. Then just talk to them about a program like Spark. Ask the Higher Education Admins numbers on interested college students to come and teach. Ask the college admin about times the College students can come. Ask if they could also get numbers on professors to mentor

- (Assuming Positive Response From Both) Find a group of professors and high school admins to consult

Our experience

We just had to email people we knew and professors that we knew to be good at their jobs. We then would meet with each professor/ high school admin/ higher ed admin and learn what we wanted.

Recommendation

If you have a child at a high school try to get them to help recruit teachers. If you have a child in college have them recruit professors/ admin otherwise you will likely have to cold call these people. You want to use these people to help you build curriculums and you need them to gauge student interest.

- Curriculum Building

*Check the Common Areas of Concern under the heading Curriculum Building
(Special Note: You can leave the curriculum building to the educational staff)*

- Creating times for the program

Check the Common Areas of Concern under the heading Creating times for the program

- Observe and enjoy the program grow

Appendix

Example Curriculum Draft

Goals

- Introduce the topic of design thinking
- Explain why it is important
- Introduce the mindset or thinking process that design thinking involves

Lesson Plan

1. Introduce everyone (did not need to be done in this situation because everyone was well acquainted maybe similar at a high school)
2. Introduce self
3. Begin with a prepared statement about what design thinking / user experience design / research encompasses.
4. First Activity
 - a. Have the group take a few minutes to write down a list of things that they have problems with using in their lives
5. Reconvene and have each person share about 3 of the things that they have the most issues with in his/her life.
6. Second Activity
 - a. Have the group now answer the question of how would you solve the problem or vexing thing in your life
 - b. Why did you start with a solution?
 - c. Have them answer why is that an appropriate solution?
 - d. Have them write down why they think it is a solution
7. Discuss
 - a. Have each student share their idea and why it is an appropriate solution
 - b. Talk about how some of those ideas can be framed differently
 - c. empower students to think
8. Final Question'
 - a. Asked in front of the entire group
 - b. How would you find out that the solution works in general for the problem
9. Ask about final takeaways
10. Ask if anyone has final questions

Example Final Curriculum

Day 1 (55 - 60 minutes)

1. Introduce our plan for the day **(1 minute)**
2. Introduce ourselves and our project and settle in **(5 minutes)**
 - a. Our names and background to have them get a feel for us and our significance.
 - b. Talk about our project purpose:
 - i. There are many tech jobs that are unfilled at Google, Microsoft, Amazon
 - ii. Want to bring this topic to the high school setting
3. Start with question **(2 minutes)**
4. Discuss question **(3 minutes)**
5. Introduce informatics and topic and how it's relevant **(10 minutes)**
 - a. Informatics is the study of information (Also a mindset)
 - b. With it, you can become a Web Programmer, UX/UI Designer, Project Manager, Data Analyst, Data Security Specialist, (create a better world)
6. Break them into 3-4 groups **(3 minutes)** (make sure each of us is actually involved heavily in leading these groups and the groups should be 6 - 8 people)
7. First group activity: each teacher of the group discuss these questions **(7 minutes)**
 - a. What is something you use often and enjoy using? Why do you enjoy using it? What makes it easy, enjoyable to use? (may have to further break these questions down)
 - i. Facebook?
 - b. What is something you use often and don't enjoy using? Why don't you enjoy using it? What makes it difficult, not enjoyable to use? (Ask What makes it difficult to use then ask what makes it not enjoyable)
 - i. Websites?
 - ii. TV Guide
8. Second Activity: walk them through this process **(13 minutes)**
 - a. Ask them if they were going to change that one bothersome thing in their life, what would they do first?
 - b. Then depending on where they start ask them why they chose a solution and if they chose to start a different way ask them why they chose to start that way.
 - c. Then tell them how you would start.
 - i. Make sure to highlight the starting from a question and not a solution
 - d. Now have the group now answer the question of how would you solve the problem or vexing thing in your life?
 - e. Have them answer why is that an appropriate solution?
 - f. Have them write down why they think it is a solution

- g. Discuss
 - i. Have each student share their idea and why it is an appropriate solution
 - ii. Talk about how some of those ideas can be framed differently
 - iii. empower students to think
- 9. Come back to whole class: talk about why BLANK is well designed and how it was designed **(5 minutes)**
- 10. Introduce the design process and why it's important **(5 minutes)**
 - a. Steps
 - i. Understand the problem. (The root of the problem)
 - 1. Snapchat is not as well designed as it could be
 - ii. Understand the user. Walk them through to develop stories, use these as examples.
 - 1. As a user, I want to...
 - 2. send photos that disappear so they don't stick around
 - 3. make a "story" page so people can view my life
 - 4. view friends' photos that are sent to me
 - 5. use filters on photos to add cool effects to my photos/videos
 - 6. message friends to keep in touch
 - 7. send "SnapCash"
 - iii. Ideate
 - 1. Have them develop
 - iv. Develop a prototype
 - v. Iterate
 - b. Explain why design is an important process.
 - i. It is a mindset or process meant to make people think deeply about how to build the best thing for the most people.
 - ii. Common problem is people jumped directly to brainstorming a solution often leading to the wrong solution.
- 11. Final closure question **(1 min)**
 - a. How would you find out that the solution works in general for the problem?
- 12. If time left, ask if anyone has any questions

Day 2 (55 - 60 minutes)

- 1. Introduce today's plan and what we covered the day before **(2 minutes)**
- 2. Go over design process again **(2 minutes)**

3. Introduce a product we will be “creating” (for example: design a lunchbox for a bike commuter) with the user centered design process **(5 minutes)**
4. Get them back into their groups **(3 minutes)**
5. Go through the five steps, each time breaking into groups work as team as we go around to facilitate discussions. Periodically come back together to introduce the next step **(30 minutes)** (make sure we are thoroughly involved in the groups)
6. Share what each team “designed” and why they created it that way **(5 minutes)**
7. Explain the broader applications of what they just did and challenge them to apply the process to more areas of their life **(5 minutes)**