

An Analysis of You Cubed as an Example of Collective Creativity

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Abstract

A collective creative work is any endeavor in which the effort of many individuals synergizes or accumulates into a novel result. This paper uses a single community art project, titled You Cubed, to examine what factors motivate people to contribute to collective creative works. Analysis is based on correspondence with project organizers, documents related to the project, and surveys sent to volunteers. Many factors were found to be useful, including careful early planning, leveraging existing frameworks, and a group environment.

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Introduction

Collective creative works have played a major role in society throughout history. Major examples include festivals, large artistic wonders, and the collective research and invention that fuel the advance of science and technology. Collective creative works can be valuable for aesthetic enjoyment, for religious fulfillment, for practical convenience, to bring communities together, or just to keep people busy and entertained.

For all of the advantages of collective creativity, these works are not spawned arbitrarily. They require people to be motivated and coordinated. This paper begins with the following questions. What motivates people to contribute to collective creative pursuits? How are large-scale creative projects carried out? How do these projects make the most of people's effort?

To answer these questions, this paper uses one instance of such a project as a lens with which to view the general case. In the latter half of the year 2008, First Night Worcester coordinated a large community project whose ultimate product was an iconic origami sculpture made out of business cards. This project was titled You Cubed.

Background

First Night Worcester is a non-profit organization that organizes a yearly New Year's arts festival in Worcester, Massachusetts. It is part of a larger organization, First Night International, that sets standards for similar celebrations in many cities. On December 31, 2008, more than 111 cities worldwide hosted First Night celebrations. Celebrations are held on New Year's Eve, and are named for the coming year. Thus, December 31, 2008 was the date of First Night 2009.

Arts festivals are, in and of themselves, collective creative works. Already, the comparison between First Night International and local First Night organizations demonstrates some of the concerns for coordinating large scale creative projects. First Night International grew out of First Night Boston and the desire to share the expertise gained from that organization's success with groups in other cities. First Night Worcester started in 1981.

First Night celebrations in Worcester require a great deal of logistical work to set up, such as finding and paying artists to perform, finding exhibition locations for various attractions, and arranging for city services. First Night Worcester prides itself on community-building projects, which means that it is actively engaging people in creative projects for much of the year. This means that large numbers of people, many of whom never meet each other, work together on projects that serve an abstract need, have many factors and pieces that have to fit together in an orderly and coherent way, and must be completed within a specific time-frame.

The Executive Director of First Night Worcester is Joyce Kressler. This is the person who answers information requests, works with artists and community leaders, and takes a clearly active role in managing First Night Worcester. In 2008, she worked with artist-mathematician Jeannine Mosely, who specializes in origami, has a Ph.D. from MIT, and has an accomplished record as an artist. Working together on You Cubed, they coordinated, focused, and made possible the efforts of hundreds of Worcester community members, all directed toward a unified goal.

You Cubed

Any large scale project goes through an involved process from conception to completion. At the beginning, someone suggests an idea that serves as a jumping-off point. This idea gets passed around, molded, and extended into a plan. No plan can perfectly account for how a project will progress, so

details fill in and change over the course of the project. This section of the paper examines the mechanics of how the You Cubed project was carried out. Included are a description of the initial concept, a look at how plans progressed in parallel with the realities of the project, examples of a few different scales of coordination, and a summary of how the organizers of the project viewed its outcome.

The Business Card Menger Sponge Project

You Cubed began as an expansion of a proven concept. Previously to You Cubed, Dr. Mosely successfully completed a community project whose goal was to build an origami sculpture out of business cards in the shape of a depth 3 approximation to Menger's Sponge. This was aptly named The Business Card Menger Sponge Project.

Menger's Sponge is a fractal solid of the following form. Start with a cube, and divide it into 27 identical smaller cubes. This shape resembles the popular Rubik's Cube. To get a depth 1 approximation, remove the cube in the center of each face and in the center of the whole collection. This leaves eight corners cubes and the twelve edge cubes that connect the corners together. To get the depth 2 approximation, repeat the above process on each of the twenty small cubes in the depth 1 approximation. To get an approximation of any depth N , repeat the above process on each of the small cubes that remain in the depth $(N - 1)$ approximation. Infinitely repeat this process to get Menger's Sponge. Illustrations can be found at <http://www.theiff.org/oexhibits/menger02.html>.

For the Menger's Sponge origami sculpture, the basic unit was a cube made by folding together 6 business cards. These cubes were then linked together to form larger structures.

Dr. Mosely began the Business Card Menger Sponge Project with a basic shape in mind. To build this shape, she required 48000 cards for the core structural components. Early in the project, she decided to add 18048 additional cards in a process called paneling. This is where extra cards are

attached to outside faces in a way that hides all the flaps. Paneling allows for added flourishes in the appearance of the sculpture, in this case matching six colors to the external faces based on which plane each face lies in

Once chosen, the design for the sculpture was assessed for structural integrity. Each subunit of the structure had to be considered for what forces would be put on it and how much of those forces it could handle. In particular, sections above the very bottom put pressure on the sections below them, and sections that did not have direct connections to cards below them had to be held up by the sections next to them, exerting shear forces. Since, the business cards were of higher-than-average quality, each box of 500 cards weighed about 18 ounces. The whole depth 3 sponge was therefore projected to weigh about 150 pounds (68kg), with each of the depth 2 sponges weighing about 7.5 pounds (3.5kg). This meant it would not be possible to lift the final sculpture off its table, so a pallet would have to be built to hold it.

In total, the sculpture was 54" x 54" x 54". This meant that forces would be spread out. However, they would not be spread evenly. To create a worst case approximation for the weight of the structure, the artist noted that only 64 cubes on the bottom were connected through unbroken columns to the top of the sponge. Assuming these 64 cubes would carry the weight of the entire structure, they would have to carry a load of about 2 pounds (1kg) each. To determine the strength of an individual cube, Dr. Mosely built one and stacked 18-ounce boxes of business cards on it until it began to show signs of stress. This required 10 boxes, so even erring on the side of caution, the structure would easily support the downward pressure of its weight.

To determine if the structure would hold up under shear forces, Dr. Mosely noted that, for each of the four suspended depth 2 sponges on the top layer of the sculpture, two opposite sides of the suspended sponge were each connected to a directly-supported neighbor by 64 mutually connected cube

faces. The artist guessed that this spread out the weight enough not to cause excessive shear. Therefore, she believed the sculpture would support itself.

Dr. Mosely built a level 2 sponge and extrapolated from that how construction would progress. The level 2 sponge required 3456 cards and 30 hours. She estimated 600 hours to construct a level 3 sponge by herself. Based on this experience, she determined how to divide construction so that many volunteers around the country would build subassemblies that could be brought or shipped to a central location for final assembly.

In order to ensure a smooth process, careful consideration had to be given to what subassemblies would be used as building blocks. The artist chose for the primary module to be a “tripod,” a block of four linked cubes consisting of three cubes attached to mutually adjacent faces of a corner cube. These modules would be easy to teach to large numbers of volunteers and easy to make quickly. Identical tripods made up 80% of the final sculpture. They could be linked in way that made sure no one would ever have to reach into small, confined spaces to manipulate them. They could be paneled after construction was finished.

Business cards for the base structure were obtained from the Dr. Mosely’s colleagues at work. Several times in 1995, various factors led to quickly changing business cards – the old ones could be used in the sculpture. Colored business cards for the exterior paneling were provided from bad print runs saved by Jay Meddaugh of American Wholesale Thermographers of Woburn, Massachusetts.

The Business Card Menger Sponge Project was completed over nine years. Several hundred people from around the country volunteered to help construct the sculpture.

The Project Proposal

Using the successful Business Card Menger Sponge Project as a guide, the idea for You Cubed was to build a large, modular structure using business card origami that could be constructed by many volunteers in the months leading up to First Night Worcester 2009. The stated objectives were to build structures to be ready for display at First Night, to be a community art project that engages as many people as possible prior to First Night, and to teach math, design, and engineering principles to participants.

The main pieces of this project would be as follows. Any large project needs people to carry it out, so recruiting volunteers is a primary task. Since this project would require a large number of volunteers to help with construction, some participants, called workshop leaders, would need to be trained to guide the people who would be constructing the sculpture. The sculpture would need to be designed. Materials would have to be collected. An exhibition site would have to be found at which the completed sculpture could be displayed. Finally, the sculpture would be built in pieces, and these pieces would be assembled at the display site.

The initial plan was to have volunteers fold cards, build pieces of the sculpture, move sub-assemblies to the final site, make explanatory placards for the exhibition site, and build support structures for the final sculpture. Most of the volunteers involved in construction would be students in the 21st Century After School Program. This is a federally-based program that offers academic enrichment during non-school hours to students in grades 3-8. Within the context of You Cubed, the 21st Century Program is the local implementation that is part of Worcester Public Schools. Additional volunteers from other segments of the community could possibly be recruited to fold business cards. Which other segments was not specifically laid out, although senior centers were given as an example.

The workshop leaders who would guide participants in construction would primarily be math and art teachers drawn from Worcester Public Schools. 3-5 students from Worcester Polytechnic

Institute were also expected to act as workshop leaders. For larger-scale coordination, one teacher from each school would communicate between that school and the rest of the project, and a WPI professor would supervise the WPI students.

The overall project would be managed and directed by Dr. Jeannine Mosely and Ms. Joyce Kressler, with Dr. Mosely acting as project head. In addition to being project head, Dr Mosely expected to teach the workshop leaders, who would in turn teach the volunteers who construct the sculpture.

The initial plan included a holistic educational component to the project. Specifically, it states, “The project curriculum will include instruction in origami, mathematics and engineering. The origami component will include cube folding and assembly, paneling, simple linking, and complex linking of cubes. The math component will include arithmetic, geometry, simple topology, exponents and logarithms, and recursion. The engineering component will cover load bearing calculations, decomposition principals for quick linking, estimations of time, weight, cost, etc., part tolerance and quality control.”

The You Cubed project proposal stated that participants would design the sculpture. Dr. Mosely would oversee the design process, but the process itself was left vague. The design would depend on how many volunteers were recruited and the space available. In addition, the possibility was open for participants to submit their own smaller sculptures to add to the display. In order to estimate what resources and time would be required, example designs were used as stand-ins. These were a castle and a diagonal holed fractal sponge.

For the example designs, the number of business cards required was estimated at 250,000 for the base structures and 100,000 for paneling. These numbers included a high estimate for cards that would be unusable or wasted. Joyce Kressler and/or Jeannine Mosely would obtain the base structural cards,

and Ms. Kressler would be responsible for obtaining paneling cards from sponsors. In addition, Ms. Kressler would be responsible for finding an exhibition location.

Time estimates were given as follows. Training Worcester Public School teachers would take two days, as would training WPI students. Construction time, including teaching volunteers, various stages of construction, wasting time, and estimation error from excessive optimism, was estimated at 2400 person-hours. This was then broken down as 10 classrooms with 15 students per classroom working for 1-hour sessions twice a week for eight weeks. Final assembly at the display site was estimated to take 2 days. In addition, Dr. Mosely would be available for 2-4 additional days or 3-6 half-days for meetings, workshops, and trouble shooting.

At the end of the project proposal was a timeline. Over the summer, the plan was to complete design work for one of the example sculptures, meet with 21st Century Program directors, and train teachers. The plan was to find an exhibition site and acquire cards for the core structure by September 1st. School starts at the end of August, so September is when WPI students would be trained and when the actual sculpture would be designed. In October and November, project organizers would acquire paneling cards, design the layout for the paneling cards, and write software to simulate the final appearance of the sculpture. In December, subassemblies, placards, and the pedestal would be completed, everything would be moved to the display site, and the final sculpture would be assembled at the display site. First Night Worcester 2009 was scheduled to occur on December 31, 2008.

How the Project Progressed

Twenty-five teachers attended training sessions in order to run workshops and integrate You Cubed into the math curriculum. Workshop leaders also included 12 WPI students, 8 students for Holy Cross College, and 15 honor students from Shrewsbury High School. Volunteers were solicited from

schools, youth centers, senior centers, and the blind community. However, the primary turnout came from students in grades 3-8 in the 21st Century After School Program. In the end, 15 schools including 20 classrooms and 400 students participated. In addition, 100+ WPI sorority members helped to assemble a complicated section of the sculpture.

In the words of Ms. Kressler, “Working with the heads of Worcester Public Schools curriculum development and math departments, Dr. Mosely integrated arithmetic operations such as adding, multiplying, estimating, and approximating, and geometric concepts for computing lengths, areas, and volumes. Students learned about vertices (corners), edges and faces and the concepts of "voxels" and resolution. Simple engineering methods were demonstrated, including modeling, scaling, computing weights, load testing, scheduling and manufacturing to tolerance. Students benefited from repeating the basic construction steps and learning to think spatially, in three dimensions.”

For the design of the sculpture, Worcester Public School teachers chose Worcester’s Union Station. They wanted a recognizable landmark, and Union Station is an iconic structure for both historical and artistic reasons. It is located at 2 Washington Square, Worcester, MA 01604. The display site for the sculpture of Union Station was chosen to be the Worcester Art Museum, located at 55 Salisbury Street, Worcester, MA 01609.

Unlike a fractal sponge, Union Station has a very heterogeneous structure. Most of the sculpture was made of linked cubes. However, arches are used throughout the building, which translate into diagonal segments in the origami sculpture. The exterior walls have many openings. A diagonal wall connects one of the side walls to the rear wall. The roof has a complicated vault pattern. Two large towers on the front of the building capture this complexity within themselves. Internal support for the origami sculpture was purely practical, rather than matching the internal structure of Union Station.

With a design in place, material estimates were revised to 250,000 business cards total, including waste and students diverting cards to their own constructions, and 100,000 cards for the final Union Station sculpture. The project was underwritten by enough donations to carry it out. However, additional donations were requested, with the perk being that donors would have their cards displayed within the sculpture. Resources for the project were interchangeable with the rest of First Night Worcester 2009. A budget of \$10,000 was allocated for administrative costs and fees to Dr. Mosely.

The final sculpture incorporated around 10,000 cubes. The two large towers on the front of the building contained around 1,000 cubes each, and the roof vault contained around 2,000 cubes. Students in the 21st Century Program produced more than enough cubes for the sections assigned to them, so the best cubes could be selected for use in the sculpture.

Assembly assignments were made with knowledge of what groups of volunteers were participating in the project. Specific groups included were 21st Century program kids, WPI sororities, and Dr. Mosely herself. Workshop leaders were not assigned to construct sections of the sculpture, since leading a workshop required a volunteer's full attention.

Dr. Mosely assigned herself the roof vault. She was uncertain about how much internal support this section would need. Whoever built it would have to adjust the design on the fly, so it was easiest for Dr. Mosely to take this job.

The towers were assigned to WPI sororities. These were complex sections that would have taken an unreasonably long time to explain to people who didn't already have specialized engineering skill. In addition, by assigning these sections to college students, there was no concern that a couple of 21st Century Program classrooms would appear to have gotten favorable treatment over the rest.

The diagonal wall connecting one of the side walls to the rear wall was considered mildly challenging, and was therefore assigned to a classroom with older than average students. Some of the

interior bracing pieces were assigned to a group of middle school kids for the same reason. The rest of the sculpture was considered simple enough for any participant, and sections were assigned randomly to different 21st Century classes.

Participants had varying skill levels relating to different aspects of construction, such as folding cards, assembling cubes, or linking cubes. These tasks could be divided up to allow participants to work on the tasks they could do best.

The weather proved disruptive a couple of times during You Cubed. Part of the plan was to collect single cubes and small sections from classes on a regular basis to bring them to the final assembly sight. An ice storm closed schools for the remainder of the year, forcing the 21st Century Program Coordinator to make special arrangements to collect the remaining pieces. In addition, a snow storm on New Year's Eve, followed by continuing unpleasant weather throughout the day and evening, dampened attendance of the exhibition.

A Sample of Logistical Planning

To get a sense of the details of logistical planning, this subsection examines You Cubed within the scope of WPI. WPI's involvement in You Cubed was coordinated by Emily Perlow, the Associate Director of Student Activities and Greek Life Programs.

On September 16, 2008, in order to recruit workshop leaders, Ms. Perlow sent an email announcement to groups interested in community service. The subject line grabs attention by presenting an incentive to volunteer – community service credit for Federal Work Study financial aid – and by highlighting the spectacle of the project – “Help build the largest origami sculpture Worcester has ever seen!”

In the body of the email, all information is presented briefly, with an almost bullet-point style. The first few sentences describe the project in a way that gives potential participants a hint of what they are being asked to volunteer for, as well as building excitement for the project with expansive phrasing. After this is a sentence that concisely conveys the key information volunteers need to determine if this project fits into their schedules, followed by a reiteration of the incentive highlighted in the subject line. After this is enough information about the training session for participants to be able to attend, followed by a list of resources provided by the project to alleviate any seeds of concern over incurring extra hassles by signing up for this project. The last piece of information provided in the email is how to volunteer. This is made very easy, as volunteers just have to send an email to an address provided in the recruitment email or reply to the recruitment email directly.

The training session was held on September 24 from 4pm-5:30pm. Volunteers were expected to lead one workshop per week for eight weeks from 2-4pm, between the dates of September 25, 2008 and November 14, 2008. WPI and/or First Night offered one training session, transportation to and from workshop sites, business cards, printed instructions, and storage bins.

In addition to recruiting workshop leaders, Ms. Perlow organized construction of the sculpture's two large towers by members of WPI's sororities. This event took place on Dec 14. Plans for this took into account logistics for not only making the event happen but also for how the event would progress throughout the day. An email sent November 20, 2008, that hammers out the details reads as follows.

“Hi Ladies,

We're confirmed for the Origami cube project with First Night Worcester on **December 14**.

Between 9:30am and 1:30pm, we need members of the chapters to show up in **Odeum A** to help build the cubes. I want to make sure we have a steady number of people throughout the morning. Can you divide your members up to arrive during that time at a pretty steady interval?

We need to get about 4 volunteers from each chapter to learn how to build the cubes at 9am and help show people throughout 9am-1:30pm how to build them. It's pretty easy—I can teach people in about 20 minutes.

At noon, we need a team of 8 people from each chapter to arrive to help assemble the towers. Jeannine estimates it will take a team of 6-10 people 2.5-3 hours to build each tower. With more people, it should take a little less time.

I will order food for the day based on the number of people coming for each chapter.

Can you please confirm total numbers from each chapter and the individuals who will help teach cubes and those who will help build the tower **by December 9?**

Also, anyone who has work study, this counts for Community Service Work Study hours. It also counts as Community Service for the chapters as well.

Thanks for your help ladies,

Emily”

Success According to the Organizers

According to Ms. Kressler, First Night Worcester determines the success of a celebration as follows. “We have a review of the event after it's completed and surveys collected from site captains, volunteers, artists, performers and celebrants. Obviously, buttons (used for admission) are a source of revenue as well as an indication of attendance.” First Night Worcester 2009 drew in approximately 12,000 visitors. You Cubed was particularly popular, with 1,407 visitors viewing it on December 31, 2008 and 4,866 visitors viewing it during January 2009. The sculpture was moved to the Worcester Historical Museum for several months afterwards, and it continues to draw interest.

The 21st Century Program Coordinator was very happy with the project, and was eager to conduct similar projects in the future.

Surveys

Methodology

In order to get a more detailed picture of how You Cubed worked in practice, a series of three surveys was sent to the WPI students who volunteered to help run the workshops. The first survey contained questions relating to the volunteers' backgrounds, reasons for volunteering, and expectations before the project. The second survey contained questions designed to assess the success of You Cubed and to compare volunteers' expectations to what actually happened. The third survey focused on the process of getting kids involved and keeping them engaged, both in You Cubed and in creative projects in general.

Each survey was sent to all 12 volunteers, and again to anyone who did not respond the first time. In total, seven people responded to the first survey, five responded to the second survey, and four responded to the third survey. Three people responded to all three surveys, three responded to two of the surveys, and one responded only to the first survey. Their responses are given in detail below in the "Data" subsection.

In order to maximize response rates, the first two surveys were designed to allow respondents to answer quickly. For every question that did not have an immediate answer, such as gender or class year, multiple-choice options were provided. Respondents then had the opportunity to add additional information as they saw fit. A third survey, consisting of open-ended questions, was created to collect information on matters for which results could not be anticipated and aggregate information was less important than individual responses.

The first three questions of the first survey asked the volunteers for their a) gender, b) class year, and c) major. The next four questions asked for background information related to how they came to

volunteer. These were d) “How did you learn about this opportunity?” e) “Why did you volunteer?” f) “What is your previous experience with First Night?” and g) “Do you have previous experience relevant to your current position?” The last two questions asked the volunteers more specifically about their expectations going into this experience. These were: h) “When you first volunteered, what level of commitment did you expect to give, on a scale of 1 (very little) to 5 (eating your life)?” and i) “What do you expect the kids to get from this experience?”

For d) above, the answer choices were “An email from a WPI official, A friend, A professor, A school club, Your fraternity/sorority, Other:_____”. For e) they were “To help the community, Leadership experience, Teaching experience, You know someone else who is involved, To be part of First Night, To keep busy, Something to put on a resume, Work study credit, Other:_____”. For f), the answer choices were “None, Attended in another city, Attended in Worcester, Volunteered to help, Participated through an affiliated school or organization”. For g), the listed choices were “No, Yes: (Optional Description)” For i), the listed choices were “Have fun, Learn about art, Learn about math, Learn about engineering, New appreciation for art, New appreciation for math, New appreciation for engineering, Stronger sense of community, Inspiration to do creative projects, Better self-esteem, Keep out of trouble, Nothing, Other:_____”. For all other questions in the first survey, answer choices were not explicitly listed.

In the second survey, the first two questions examined concrete ways in which volunteers showed how much of a connection they had with You Cubed after their initial task ended. These were j) “Did you attend First Night Worcester?” and k) “Did you see the final sculpture?” Of the next five questions, three compared the volunteers’ initial expectations to their actual experiences, and two asked about the success of the project. In order, these were l) “What personal goals did you achieve?” m) “Was this experience worth the commitment?” n) “What level of commitment did you give to this

project, on a scale of 1 (very little) to 5 (eating your life)?” o) “What do you think the kids got from this experience?” and p) “Do you think this project was successful?”

For question l), the answer choices were “Help the community, Leadership experience, Teaching experience, Have fun, Get a better connection to First Night, Keep busy, Something to talk about, Something worth putting on a resume, Other:_____”. For question o), the answer choices were the same as for i) above: “Have fun, Learn about art, Learn about math, Learn about engineering, New appreciation for art, New appreciation for math, New appreciation for engineering, Stronger sense of community, Inspiration to do creative projects, Better self-esteem, Keep out of trouble, Nothing, Other:_____”. For all other questions in the second survey, answer choices were not explicitly listed.

Three questions in the second survey directly corresponded to questions in the first survey. Questions e) and l) had partially matching answer choices, and the choices matched between questions h) and n) and between questions i) and o).

In the third and final survey, the questions were q) “Were the kids motivated to participate?” r) “What worked and what didn't work for motivating the kids to participate?” s) “What did you learn from this experience?” and t) “Do you have any other ideas or comments with regard to motivating people to do creative works or activities?” No answer choices were listed. Instead, respondents were asked to give as much information as they could in whatever time they were willing to spend.

The first time this survey was sent out, one of the respondents interpreted question t) differently from how the question was intended to read. For further releases of the survey, the wording was changed by replacing “motivating” with “how to motivate.” Volunteers were not asked to change answers they had already submitted.

The first survey was sent out on December 3 and 8, 2008. This was after the workshops ended, so the timing was not ideal. The second survey was sent out on January 28 and 30, 2009. This gave

participants a chance to attend First Night Worcester and to see the sculpture they helped to build. The third survey was sent with its original wording on February 10, 2009 and with modified wording on February 14, 2009. On October 28, 2009, a volunteer who had not previously responded offered to answer all three surveys. Copies were sent with modified wording as indicated above, and responses were received on the same day, October 28.

Labeling respondents by letter, responses to the first survey were received from respondents 'A', 'C', 'E', and 'F' on December 3, 2008, from 'D' and 'G' on December 8 after the survey was sent a second time, and from 'B' on October 28, 2009. Responses to the second survey were received from respondents 'A' and 'C' on January 28, 2009, from 'E' on January 29, from 'D' on January 30 after the survey was sent a second time, and from 'B' on October 28. Responses to the third survey were received from 'A' and 'F' on February 10, 2009, from 'D' on February 17 after the survey was sent a second time, and from 'B' on October 28.

Data

In this subsection, responses to each survey are listed by question. In the case where a volunteer responded to only some of the questions on a survey, non-responses to the remaining questions are noted.

For the first three questions on the first survey, the responses were as follows.

- 'A': female, sophomore, engineering physics major
- 'B': female, junior, civil engineering major
- 'C': male, junior, aerospace engineering major
- 'D': female, freshman, chemical engineering major
- 'E': female, freshman, industrial engineering major

- 'F': female, freshman, mechanical engineering major
- 'G': male, senior, management major

To the question "How did you learn about this opportunity?" the responses were as follows.

- 'A': "An email from a WPI official - Emily Perlow, Your fraternity/sorority - Phi Sigma Sigma."
- 'B', 'D', 'E', 'F': "An email from a WPI official."
- 'C': "An email from a WPI official - Emily Perlow, Your fraternity/sorority - Alpha Phi Omega."
- 'G': "Your fraternity/sorority - My fraternity's president, [Name]."

To the question "Why did you volunteer?" the responses were as follows.

- 'A': "To help the community, Teaching experience, To be part of First Night."
- 'B': "To help the community, Work study credit."
- 'C': "Teaching experience, To be part of First Night."
- 'D': "Leadership experience, Other: I like working with kids so I thought it would be a good opportunity for me to do so. Also, the idea of making cubes out of business cards sounded interesting."
- 'E': "Other: To get into the Worcester Area and off the WPI campus. To meet kids who live and go to school in the city, buy their groceries at the local store, Hang out at the local parks."
- 'F': "To help the community."
- 'G': "To help the community, Other: I enjoy working with kids."

To the question, "What is your previous experience with First Night?" the responses were as follows.

- 'A', 'B', 'D', 'E', 'F', 'G': None.
- 'C': Attended in another city.

To the question, “Do you have previous experience relevant to your current position?” the responses were as follows.

- ‘B’, ‘C’, ‘D’, ‘F’: No
- ‘A’: “Yes: I’ve taught at an elementary school over the past two summers.”
- ‘E’: Yes
- ‘G’: “Yes: counselor at a summer camp for the last two summers”

To the question “When you first volunteered, what level of commitment did you expect to give, on a scale of 1 (very little) to 5 (eating your life)?” the responses were as follows.

- ‘B’, ‘E’: 2
- ‘A’, ‘C’, ‘F’, ‘G’: 3
- ‘D’: “5, but it's not eating my life. Since I'm only doing this once a week, I don't think it's a big time commitment.”

To the question “What do you expect the kids to get from this experience?” responses were as follows.

- ‘A’: “Have fun, New appreciation for art, New appreciation for math, Stronger sense of community, Inspiration to do creative projects.”
- ‘B’: “Have fun, Learn about engineering, Inspiration to do creative projects.”
- ‘C’: “New appreciation for engineering.”
- ‘D’: “Have fun, Inspiration to do creative projects, Other: develop my leadership skills.”
- ‘E’: “Have fun, Inspiration to do creative projects, Keep out of trouble.”
- ‘F’: “Have fun.”
- ‘G’: “Have fun, Stronger sense of community.”

As additional comments on the first survey, ‘A’ said, “Working with the kids is lots of fun and very rewarding. It's great to see how much they enjoy making the cubes, and how quickly they learned

the skills needed.” ‘F’ said, “This was a very good experience. It was well worth the time commitment. I would gladly do it again.”

On the second survey, responses to the question “Did you see the final sculpture?” were as follows.

- ‘A’: “Only in pictures.”
- ‘B’, ‘C’, ‘D’, ‘E’: No

To the question “Did you attend First Night Worcester?” responses were as follows.

- ‘A’: “No, I had planned to but other circumstances prevented me from going.”
- ‘B’ did not answer the question.
- ‘C’: “Unfortunately no.”
- ‘D’: “Yes, I volunteered.”
- ‘E’: “Yes.”

To the question “What personal goals did you achieve?” the responses were as follows.

- ‘A’: “Help the community, Leadership experience, Teaching experience, Have fun, Something to talk about.”
- ‘B’: “Wasting my time.”
- ‘C’ left the answer choices exactly as they were written in the survey.
- ‘D’: “Help the community, Teaching experience, Have fun.”
- ‘E’: “Leadership experience, Teaching experience, Have fun.”

To the question “Was this experience worth the commitment?” the responses were as follows.

- ‘A’, ‘C’, ‘E’: Yes
- ‘B’: “No, I spent a lot of time going places only to be blown off and have to walk back to campus, or find a ride from someone.”

- ‘D’: “Yes it was. It was a good way for me to help out in the community and at the same time have fun. Even though I was able to do it for 4 weeks, I liked helping the kids create something that was part of an even bigger project.”

To the question “What level of commitment did you give to this project, on a scale of 1 (very little) to 5 (eating your life)?” the responses were as follows.

- ‘A’: “3, it wasn't very time consuming, just an hour a week, then some extra help at the end to build it.”
- ‘B’ did not answer the question.
- ‘C’ answered 3. ‘D’ answered, “1 as it was only once a week for an hour.” ‘E’ answered 2.

To the question “What do you think the kids got from this experience?” the responses were as follows.

- ‘A’: “Have fun, Learn about art, New appreciation for art, New appreciation for engineering, Inspiration to do creative projects, Better self-esteem, Keep out of trouble.”
- ‘B’: “Nothing.”
- ‘C’ left the answer choices exactly as they were written in the survey.
- ‘D’: “Learn about art, New appreciation for engineering, Inspiration to do creative projects.”
- ‘E’: “Have fun, Inspiration to do creative projects, Keep out of trouble.”

To the question “Do you think this project was successful?” the responses were as follows.

- ‘A’: “Yes. The project had much community involvement, with many different schools and kids from a range of ages, and sponsorship from local companies. The kids I taught were all part of an after school program that loved making the cubes. They even wanted to continue building their own things after the final day of school. Some were excited to say that they had a piece of art on display in the Worcester Art Museum.”

- ‘B’: “No. The one kid I did get to work with once was impatient and didn't want to sit still and kept leaving. The teacher had to bring him back.”
- ‘C’: “Yes.”
- ‘D’: “I only went to a few sessions, which were at two different schools, so I can't say. I didn't see the final outcome, but I'm guessing it was successful.”
- ‘E’: “Yes. At least the goal set forth was met, aka to produce a finished project.”

At the top of her response to the second survey, respondent ‘D’ said, “...I've answered this survey before though.” As an additional comment on the second survey, ‘A’ said, “I think First Night Worcester should have a project like this every year, with the opportunity for school kids to help out.”

On the third survey, responses to the question “Were the kids motivated to participate?” were as follows.

- ‘A’: “Yes, most of the kids were.”
- ‘B’: No
- ‘F’: Yes
- ‘D’: “I was only able to volunteer for this 3 times, and with those 3 visits, I went to two different schools. In one school, there were only 3 students in the class that day and they had run out of materials, so we didn't create much cubes. As a result, I can't say that the kids were motivated to participate. In the other school, there were a lot more students involved, and most of them were motivated to participate. It seemed like they enjoyed doing it.”

To the question “What worked and what didn't work for motivating the kids to participate?” the responses were as follows.

- ‘A’: “They liked working in groups. The teacher and I would ask who wanted to fold cards, who wanted to build blocks, who wanted to connect the blocks, and who wanted to cover the boxes.

So most kids got to work in the group that they liked the best (or were the best at). Usually, we would have a couple "experts" in a group who would help the other kids who weren't as good with the folding or connecting. Praising the kids for doing good things helped. Showing the kids who were struggling with something a new method (a different way to make the creases sharper or how hold the cube) made them more likely to continue to try what they were doing rather than switching to a different section."

- 'B': "nothing worked. there was only one impatient kid."
- 'D': "Nearly of the kids were motivated to make cubes. Sometimes, one would find it difficult to make one and give up. But encouragement helped to motivate them to continue working."
- 'F': "They were all interested in helping out. I found that working one on one with them really got them more involved, and it was a good way to get to know the kids."

To the question "What did you learn from this experience?" the responses were as follows.

- 'A': "How well kids actually work in groups at a young age if they are doing something that is fun. Giving them the chance to chose what area they worked in made the project seem more like 'fun' instead of 'work'."
- 'B': "This project shouldn't have been done with such young children. They have no attention spans and seemed to consider the activity to be punishment."
- 'D': "I wish I was able to make more visits. If I had more time with them, I think I would've learned more. From this experience, I learned that kids needs to be given encouragement sometimes."
- 'F': "That many children aren't very privlged. To sit there and listen to 3rd graders talk about whose sister/brother went to Juvenile Jail is heart-breaking."

To the question “Do you have any other ideas or comments with regard to motivating people to do creative works or activities?”

- ‘A’: “Don't make it seem like a chore that needs to get done, but rather a fun experience, which you just happen to learn something from.”
- ‘F’: “It's a great way to help out the community. It provides children with a healthy, productive activity to do after school.”

To the question “Do you have any other ideas or comments with regard to how to motivate people to do creative works or activities?”

- ‘B’: No
- ‘D’: “Eagerness and enthusiasm is always a big component in helping other people to become motivated. Once they see how fun the activities are, then they'll participate.”

Results

The respondents' backgrounds showed notable trends. Five of the seven respondents were female, whereas the total student population at WPI has approximately three men for every woman attending. The male respondents were a senior and a junior; the female respondents were a junior, a sophomore, and three freshmen. Six of the respondents majored in an area of engineering, while the seventh majored in management. Of the 31 majors offered at WPI, 12 of them are engineering majors.

Six of the seven respondents found out about the You Cubed workshops via an email from a WPI official. Three respondents heard about them through a fraternity or sorority. None of them mentioned other channels through which they discovered this program.

To the question, “Why did you volunteer?” the most common answer was “To help the community.” Beyond that, answers were mixed. Most answers directly related to the experience itself;

only one person volunteered for work study credit, and no one volunteered to have something to put on a resume or because they knew someone else who was involved.

Only one volunteer had previous experience with First Night; he attended in another city. Three of the seven respondents had experience relevant to their volunteer position. The two respondents who specified said they their experience was over the past two summers, so no one claimed to have extensive experience. Comparing experience to reasons people volunteered, there appears to be little connection. Most reasons given by a volunteer with prior experience were also given by a volunteer without prior experience.

Most respondents expected to give a light to moderate level of commitment. On a scale of 1 to 5, there were two 2s, four 3s, and one 5.

To the question, “What do you expect the kids to get from this experience?” six respondents answered “have fun.” In addition, four respondents answered “inspiration to do creative projects,” and two answered, “stronger sense of community.” While two respondents expected kids to gain a new appreciation for art, math, and/or engineering, only one respondent expected kids to actually learn about any of these, specifically engineering. Another noticeably missing answer from the list was “better self-esteem.”

Only four respondents answered the question “Did you attend First Night Worcester?” and their responses were mixed: “No,” “No but I planned to,” “Yes,” and “Yes, I volunteered.” Five respondents answered the question “Did you see the final sculpture?” One had seen pictures of it, and none had seen it in person. This suggests that while at least some volunteers developed a connection to First Night Worcester over the course of their experience, this connection was not strongly associated with the sculpture they had helped to build.

Four respondents answered the question “What personal goals did you achieve?” For the three who had positive experiences, the answers were mostly a mix of help the community, leadership experience, teaching experience, and have fun. The first three of these choices were also given for the question “Why did you volunteer?” However, responses between the two questions did not match. Not only did some respondents not say they achieved their reasons for volunteering, but some also achieved personal goals they did not give as reasons for volunteering. None of the respondents achieved the goal, “Get a better connection to First Night;” the respondents who volunteered specifically “to be part of First Night” did not attend.

To the question “Was this experience worth the commitment?” the four respondents who answered in January said yes, and a fifth said the same in comments on the December survey. However, Respondent ‘B’ claimed in verbal communication that she did not respond to any of the surveys initially because she had a terrible experience. Rather than suggesting that the You Cubed workshops were an all-around success, this combination of answers suggests that volunteers who did not consider this experience worth the commitment did not answer the surveys.

Most respondents put in the same level of commitment they expected. Only one respondent answered differently; on a scale of 1 to 5, she expected 5 but put in 1. The first survey was sent after volunteers had put in most of their commitment, however, which may have skewed this result.

To the question “What do you think the kids got from this experience?” the results differed from volunteers’ expectations mostly in what the kids learned and what new appreciation they gained. Two respondents said the kids learned about art. The respondent who anticipated that kids would gain new appreciation for engineering did not answer this question, but two other respondents answered that the kids gained a new appreciation for engineering. None of the respondents said the kids learned or gained new appreciation for math.

As to whether the project was successful, respondents gave widely varying answers. One respondent met a series of logistical failures, only ever getting a chance to work with one kid who had no motivation to participate. Two respondents considered success to be completion of the sculpture. One of these respondents also ran into a logistical failure, where there were only three kids and not enough materials, but she was not discouraged by it in her overall impression. One respondent detailed the spectacular success of the project, speaking of wide community involvement and highly enthusiastic kids who wanted to continue with similar projects after You Cubed ended.

In general, kids were motivated to participate when there were many other kids and enough materials. This includes kids who were dealing with serious problems in their personal lives. Working in groups was very helpful. In groups with mixed skill levels, kids who were good at their tasks would help kids who were having trouble. Dividing different tasks between groups also helped, since kids could choose which groups and which tasks they preferred to work on.

Individual attention and praise helped to boost kids' motivation. When kids had trouble and grew frustrated, encouragement from volunteers would help them keep working. In the case where kids had different tasks, showing a struggling kid a new method of doing something helped them to continue rather than switching to a different group doing a different task.

Conclusion

To determine whether You Cubed was successful, relevant indicators of success must be chosen and examined. For this analysis, the chosen indicators are timely completion, attendance of the exhibition, how engaged participants were, and whether the participants viewed the project as successful. All of these indicators are useful, since the ones that relate most directly to the success of the project are difficult to measure accurately.

Even with disruptive weather conditions, the project was completed on time. Attendance was quite high. Approximately 12,000 people attended First Night Worcester 2009; 1407 of them attended the You Cubed exhibit. In addition, the sculpture had 4,866 visitors during January 2009.

Of the people who responded to direct queries asking whether You Cubed was successful, the majority gave enthusiastically positive answers. However, there was one strongly negative response. Engagement results were mixed. In environments with adequate materials and many participants, engagement levels were high. In environments with very few participants, no one was engaged in the project. This failure mode was absolute; no alternative arrangements were made to compensate. The data suggests that without this logistical flaw, however, participants would have been consistently engaged throughout the project.

Overall, You Cubed appears to have been successful. For the purposes of drawing generalized conclusions, it is worth noting that the organizers of the project took advantage of many years of successful experience. This means that many considerations went into this project that do not stand out at first glance.

Examining how You Cubed was carried out, the first thing to note is that much of the project was only incrementally different from previous projects. Organizers could rely on many similarities for planning purposes, and they could easily explain the project to prospective participants and sponsors.

The You Cubed organizers started with a short list of clear, concise objectives. At the very beginning of the project, the organizers planned the logistics out for the entire length of the project. They listed and estimated amounts for every major resource they would need, and they created an approximate timeline for when a series of high-level tasks would be completed. At this stage, specific details were left open if they did not dramatically alter logistics. In addition, the organizers planned for inefficiency in the use of time and materials. By planning out the details from the beginning, project

organizers could better anticipate and adjust for what would happen over the course of the project. By leaving details open, they had flexibility to respond to surprises and to give participants a role in creating the project.

You Cubed was managed in a hierarchical manner. At the top of the hierarchy were the people who were most experienced and most directly involved with the project. Below them were professionals who coordinated segments of the volunteer community, such as the liaisons for WPI and the 21st Century After School Program. Below them were the workshop leaders and sorority leaders, who in turn each managed a few tens of individual participants. People in the bottom levels of the hierarchy were given responsibility in groups, so that no piece of the project would rely on a small number of non-professional, uncommitted volunteers. Volunteers were drawn from organizational structures that existed outside the project, greatly reducing the work required to recruit and organize participants

Although the original plan left many details open, details were considered carefully for pieces of the project, as demonstrated by the plans for assembling the tower sections of the sculpture. This conveys the same benefits as high-level planning at the beginning. Comparing the You Cubed project proposal to the negative parts of survey respondents' experiences, the logistical considerations for the 21st Century Program were likely considered in less detail than considerations involving WPI, possibly because these appeared to fit with an established routine.

Examining how You Cubed motivated participants and made the most of their effort, many factors contributed in multiple ways. First, workshop leaders were drawn from groups of people who were already likely to enjoy the type of work being offered. For added enticement, volunteers were offered the chance to be part of something spectacular, as well as personal incentives in the form of work study credit. Teachers were drawn in by being able to choose a sculpture design they identified with strongly. Participants were also allowed to work on their own side projects as part of You Cubed.

Choice helped to engage 21st Century Program kids, as well. In this case, it was the choice of what task to work on and who to work with. Kids could take advantage of their strengths and minimize their weaknesses by choosing specialized tasks. Group involvement was a key motivator, both because kids could work with people they liked and because enthusiasm from other people was itself a major motivator. Well-functioning groups allowed members who were struggling to get quick help from other group members. Personal attention from workshop leaders helped kids stay motivated, whether it was praise, encouragement, or timely help with a difficult task.

Careful planning is essential to making the most of people's effort, as are careful attention to problems that arise and flexible responses to them.

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