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# The History of Transportation in Worcester: A Lesson and Video for Worcester Students

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## ABSTRACT

There is currently a void of materials and tools available to the elementary school teachers of Massachusetts to educate their students about the history of technology. By gathering information on the teachers' needs an appropriate tool could be designed. This project created a video and accompanying lesson plan to teach students particularly in the Worcester area, about the history of transportation as one type of technology.

## EXECUTIVE SUMMARY

The Massachusetts Education Reform Act passed in 1993, requires teachers to include technology as part of their curriculum. The Frameworks Curriculum, spawned from the Reform Act, is a set of guidelines for the technology education, in Massachusetts's schools. One section of the guidelines that has not been commonly presented by teachers is history of technology.

This project was proposed by a Worcester school teacher who found that there was a lack of available tools to educate students about the history of technology. Despite the many resources for teaching current technology, very few resources are available to teach students about how today's technology has evolved.

The original idea for this project came about when a Worcester school teacher saw a video produced for fundraising at WPI. The Capital Campaign video was a depiction of the many innovative individuals who graduated from WPI. After viewing this video, the teacher felt that it would serve as a valuable element in a lesson plan to teach students about the history of technology. However, this video contained a great deal of WPI-specific information. Therefore, it was proposed that the existing Capital Campaign video be edited to be used as a teaching resource in the Worcester school system.

Because of many technical and legal issues, it was decided that it was impractical to attempt to edit the existing video. After careful consideration, it was decided that an entirely new video should be produced. This new video

would be much different from the original video produced for fundraising purposes at WPI.

The focus of the video changed from covering multiple historical topics to covering just one topic, transportation. The Capital Campaign included too many areas of discussion, which could potentially overwhelm young students. This new video was streamlined to focus on the history of transportation particularly in Worcester. Not only was a video developed, but an accompanying lesson plan was written to reinforce what was learned in the video.

The production of the video utilized many sources. Many teachers and technical people aided in the production of the video. Also, many Worcester historical sources were used such as those at Worcester Historical Museum and the Worcester Room of the Worcester Public Library. Along with historical information, visual images were also provided by many of these sources.

Because the video would be insufficient as a stand-alone tool, a lesson plan was created to accompany it. The lesson plan was developed with the help of several teachers. Teachers from both the Worcester area and other geographical areas aided in the creation of activities used in the lesson plan.

This project created an educational resource that has not been readily available to teachers in the Worcester area. This project has succeeded in creating a lesson and video that satisfies the mandates of the Frameworks Curriculum and can be used to teach elementary school students about the history of transportation.

## ACKNOWLEDGEMENTS

There were many people who were instrumental in the success of this project. This project could not have even existed without the help of several individuals.

I would first like to thank staff members at the Worcester Historical Museum. All the librarians and desk staff were gracious and willing to help with this IQP. In particular I would like to acknowledge John Zamoida, Educational Director for the museum.

Other people that were instrumental in the research for this project were Nancy Gaudette of the Worcester Public Library and Cathy Archambeault or the Worcester Regional Transit Authority.

Several teachers and educational professionals were also involved in the success of this IQP. In particular I would like to thank Mr. David McClure, Dr. Susan Bitner, Mrs. Bonnie Hatlee, Ms. Kelly Runstrom, and Mrs. Karen Newberry, who provided not only ideas but also feedback on the entire project. Other educational professionals that should be mentioned are Mr. Charles Campbell and Ms. Joyce Gleason of the Worcester School District.

This video would not have been produced without the help of WPI's IMC. Several individuals made exceptional efforts in helping with this project especially Mr. Joseph Kalinowski, Ms. Pennie Turgeon, and Mr. Doug Thompson.

I would also like to thank those that participated in the video. First I would like to thank Mrs. Schachterle's 1998/1999 fourth grade class at the Grafton

Street School. I would also like to thank the children and staff at the Friendly House of Worcester.

Finally I would like to thank the advisors of the project not only for their guidance but also their full participation in this project. I would like to acknowledge Mrs. Melissa Schachterle for many of the ideas for the project as well as the use of her classroom. I would also like to thank Dr. Lance Schachterle for his suggestions and editing ideas. And I would finally like to thank Professor James Hanlan for his participation as an advisor as well as the use of his voice for the narration of the video.

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## INTRODUCTION

In 1993 Massachusetts passed new legislation concerning the curriculum of students in grades K through 12. The state has defined guidelines that teachers need to follow in building their lesson plans. These guidelines, known as the Frameworks, define many aspects of the students' curriculum from English to science.

Within each subject, the Frameworks outline a set of standards or goals that students for individual grade levels should be able to achieve. For instance, in the science Framework, one goal of the PreK to 4$^{th}$ grade students, is to make predictions based on past experience.

The Frameworks Curriculum for science has been broken down into science and technology. Now, teachers must not only teach life, physical, and earth sciences, but they must also include technology in their lesson plans. Within the technology section of the Frameworks there are more specific sub-parts, which are discussed in the next chapter.

This IQP concentrates on an aspect of the technology section entitled Technology and Human Affairs. Technology and Human Affairs discusses the effects and interactions humans have with technology. One way in which humans interact with technology is through determining how their lives are different now because of technological changes. This IQP deals with the history of technology, particularly in Worcester.

This project came about because a 4$^{th}$ grade teacher in the Worcester school system, Mrs. Melissa Schachterle, viewed WPI's Capital Campaign video.

This video discusses the history of technology pertaining to WPI. Great innovations and influential individuals are described in the video in terms of their relationship to WPI. Upon viewing this video, Mrs. Schachterle believed that a similar video would be a useful tool for fulfilling the Technology and Human Affairs aspect of the Frameworks Curriculum. The topics discussed are easily understandable by the students and are also pertinent to their daily lives.

In order for middle-school students to fully understand certain aspects of technology, the Capital Campaign video was not appropriate. The original purpose of the video was to raise money for WPI. Therefore the video is directed towards potential donors. Because of this, the primary focus of this project was to tailor a similar video for a young student level. Not only did the video have to be developed for this level, but it also had to satisfy the guidelines set forth by the state in the Frameworks.

This project required me to learn about three new areas of study. Because I knew nothing about educating middle-school students, this IQP required that I learn enough about teaching methods so that I could design an effective lesson. The second area of study, which I knew very little of, was the history of Worcester. In order to develop a lesson about the history of transportation I had to study how transportation has evolved from the early days of Worcester. Finally I had to learn the technology associated with developing a video. Having never produced any media such as this, it was important for me to understand not only certain details such as fading an image, but also the basic concepts associated with video production.

The project is important for several reasons. One of the main goals of the IQP is to fulfill some societal need. This video certainly fills a need. The Worcester school system lacks any sort of materials for the teachers to help their students understand human interaction with technology. Many teachers have alluded to the idea that the only technology taught in the classroom is based on computers. This video shows that there is more to technology than the latest computer chip. This video teaches the viewer that there is technology in almost every facet of our daily lives.

This video is also important because it is fun. One of the best ways to get anyone to understand a concept is to make the learning fun. The video provides a change from the way in which the students are normally taught in the classroom. A fresh voice and new ideas can often help students come to a better understanding of the subject.

The lesson created through this project is also important to society, particularly in Worcester, because the video is about Worcester. The students who learn from this video will gain an understanding of how Worcester has changed as technological advances have arisen. Hopefully, this lesson gives the students a sense of pride about Worcester because of its contributions to technology as well as how the city has grown and developed using technology.

The goal of the IQP is to show the interaction between technology and society. This project accomplishes this goal several ways. First, there is interaction between the students and the lesson. Although the use of video is not new in the classroom, it is a legitimate use of instructional technology. Also the

children are being exposed to an understanding of how their lives are different today because of technology.

Secondly there is an interaction between technology and the author. This IQP exposes the author to new ideas and technologies that I have not worked with before. Producing a video as well as a lesson plan involves many forms of technology, all of which must be understood in order to complete this project.

This IQP is a perfect example of how society interacts with technology. Massachusetts has realized that they must include technology in their curriculum to create well-rounded students. This project shows how society interacts with technology.

## BACKGROUND

The goal of this project is to help middle-school students in the Worcester school system understand the history of technology. Understanding is key to the success of this project. How we learn as adults differs from how children learn. Therefore, this section of the literature search deals with the ways in which children learn best. Knowing nothing about how children learn, the author needed to understand how children understand.

This section will discuss many techniques and theories that help children learn. One goal of this project is to incorporate these methodologies and theories into the video being produced. The incorporation of these will make this video much more effective.

- ***How to Use Creative Dramatics in the Classroom,* Andrew P. Johnson**

Andrew Johnson's article discusses the use of creative dramatics to improve understanding in young students. Creative dramatics is the use of students' imaginations to reinforce academic, emotional, and interpersonal objectives (Johnson, 1998). Johnson cites that the use of imagination and emotion in the learning process increases reasoning power. By allowing the learner to become part of the story, creative dramatics promotes a greater understanding of the material.

An example of creative dramatics might involve the history of technology. A teacher may first relay some information about the history of technology in

Worcester. The students may then do some reading about specific events regarding how certain technologies came about. Creative dramatics plays a part when students are asked by the teacher to develop a short skit based on the lecture and readings. The students must then become part of the lesson.

Creative dramatics involves students in the learning process. Rather than simply listening to a teacher or reading information in a book, students interact with the material that is to be learned. This interaction stimulates critical thinking among students. Students are required to think through the situation that they are acting out.

The use of creative dramatics also gives a sense of ownership to the students (Johnson, 1998). This methodology gives the students the sense that they are responsible for their own education. One can assume that when a student has a sense of ownership about their education, they will dedicate more effort to learning.

Finally, students become the central focus in creative dramatics (Johnson, 1998). Rather than the teacher lecturing about what events he or she feels are important, the students dictate what is important to them. With guidance from the teacher, students learn what is important to them.

- ***Understanding Through Play,* Christine Chaille & Steven B. Silvern**

Chaille contends that students, particularly younger students, often come to an understanding about something they do not comprehend through play or manipulation of their environment. When a child does not understand

something within his or her environment, he or she manipulates that object, action, or even concept. Through this play, the child can create a hypothesis about that which is unfamiliar to him or her (Chaille, 1996).

Children often create hypotheses that are incorrect, and therefore need guidance in learning. In the learning process, children, and even adults, apply what is familiar to them, when learning new ideas and concepts (Chaille, 1996). For instance, consider a child who is playing with a magnet and some paperclips. When combined with the magnet, the two paperclips stick together. If the magnet is removed, the paperclips do not stick together. The child therefore presses the two clips together between her fingers, just as she would try to stick paper together with glue. The child applies what she knows about paper sticking together to the paperclips.

This article gives a solid foundation about how children interpret events in their lives. Children learn by applying what is already in their databases of knowledge, to current events. This idea is significant in developing learning materials for children. If children learn best by applying what they already know to new events or ideas, it is beneficial to present those new ideas in the context of what they already know. In this project this refers to putting the history of technology into a context that middle-school students will understand, Worcester.

- ***Use of Elaboration Strategies by Students in Grades Two, Four, and Six,*** **Teena Willoughby, Lisa Porter, Laura Belsito, and Tara Yearsly**

Willoughby's article discusses the idea of elaboration theory. Elaboration theory suggests that individuals learn based on elaborations on current knowledge. This allows the learner to integrate "new" knowledge with "old" knowledge (Willoughby, et. al., 1999). This theory ties in with Chaille's idea that children apply what they already know to solve problems.

Elaboration theory consists of three methods, elaboration interrogation, visual elaboration strategy (imagery), and keyword strategy (Willoughby, et. al., 1999). When students learn using elaboration interrogation, they ask questions of the information they are presented. For instance students may ask "Why is that fact true?" This methodology of learning requires that the student build on prior knowledge.

Visual elaboration strategy or imagery is considered to be the most complex of the 3 strategies. This learning strategy is the most complex because it requires multiple levels of thinking. Individuals using this technique of learning need to read or listen to a lecturer (or both) as well as draw mental images. The ability to learn using this method develops between the ages of 6 and 12 (Willoughby, et. al., 1999).

The final strategy used by learners according to Willoughby is keyword strategy. In the study conducted by Willoughby this proved to be the most effective method for learning in younger learners. This method requires that

learners create links between abstract words and concrete words that sound similar (Willoughby, et. al., 1999).

- ***Reflections on Teaching in Multicultural Settings*, William P. Bintz**

Mrs. Schachterle mentioned that the Grafton Street School combines students from many different backgrounds. Therefore it was important to do some research in the area of teaching in a multicultural setting. Teaching in this setting was much different than teaching students that come from a similar background. In general people from different backgrounds and cultures bring different ideas and experiences to the classroom. It is therefore important to acknowledge this and create a learning experience that is appropriate for all individuals.

Bintz begins his article with a quote that really emphasizes the idea that people come form all different experiences. In a conversation with Piaget, an individual remarked "I know what I see." Piaget responded by saying, "No, you see what you know." (Bintz, 1995) In other words, when people are learning new ideas and concepts, they associate them to what they already know to be true based on their experiences. As mentioned above, when teaching individuals from different backgrounds who may have a wide array of experiences, the lesson must try to address all the students' experiences.

According to Bintz, insuring that everyone's experiences are addressed in a class can be very difficult. He suggests a number of questions that can help teachers to accomplish this (Bintz, 1995).

1. Are all voices being heard?
2. If not, whose voice is privileged?
3. Whose voice is silenced?
4. How can I better hear all the student voices in my classroom?
5. How can I better hear this particular student today?
6. What can students and I talk about today that would be different from what we have talked about before?

These questions can aid in keeping a focus on diversity in the classroom. By asking these questions of themselves, teachers can define areas and even students whose experiences are not being addressed.

Bintz also suggests that there are methods in discussions by which teachers can include all experiences. By focusing on life experiences of the entire class rather than what is written in the book, a teacher can more easily address all the students. And when differences surface among the students, these differences should be celebrated, and not criticized (Bintz, 1995).

In developing this video for middle-school students in Worcester, it is important to incorporate all their cultures and experiences in the video. Because of the focus of the video on the history of technology, it may be difficult to infuse a great deal of cultural awareness. However the delivery of this video should be followed by a discussion which can incorporate how each individual student relates to the presentation.

- ***Recognize the Ways We Learn,* Public Management**

This was most likely one of the most important articles read regarding how people learn. This article discusses the fact that people learn by three ways, auditory, visual, and kinesthetic.

Individuals who approach learning using the auditory method learn best by listening and speaking (Public management, 1998). For these types or learners, traditional teaching methods, that is lectures and presentation, work well. These learners hear information and then process it. Often those individuals who learn through the auditory approach ask questions during the learning process. They also tend to discuss personal experiences and think out loud. One caution that must be take with these types of learners is background noise. Unnecessary background noise can cause stress for those whose primary method for learning is through hearing.

The second approach to learning discussed in this article is visual. Visual learners learn best by actually viewing information. These are the types of people who remember best, the things they have read. Often times these learners respond better to word charts, slide shows, and videotapes, than just lectures. These types also learn better with handouts (Public management, 1998).

The final approach to learning discussed in this article is the kinesthetic approach. These individuals learn best by actually doing. In school these are known as the "hyperactive" children. Individuals who learn by kinesthetics are bothered by long periods of time where they need to sit still. These are the

learners that work well when engaged in the learning processes either through question and answer sessions, discussions, or role-plays (Public management, 1998).

- ***Helping Kids Learn – Their Own Way,*** **Lucia Solorzano**

This short article discussed the best methods for getting students to understand new material. Solorzano suggested that although traditional lectures can be good methods of teaching it is important to supplement with other forms of conveying information. As mentioned in the previous article, students learn using different approaches. The traditional lecture may only be beneficial to the auditory learner. Therefore, Solorzano suggests that audio-visual presentations be used to supplement the traditional lecture (Solorzano, 1987).

- ***Magnetizing the Learner,*** **Morris Tischler**

Tischler's article discusses yet another aspect of how students learn. Tischler talks about the idea of magnetizing the student, that is getting them interested in the subject matter.

Traditionally, students are taught the individual pieces of some larger concept. When all the smaller pieces are learned, they can be put together to for the "big picture." Tischler contents that students may become more interested in the subject if the big picture is explained before delving into the smaller parts. Once students understand the larger concept of what they are learning, the

individual pieces may make more sense. The students will also be more curious to discover how this larger concept works (Tischler, 1997).

This is an important idea, especially in creating a video. It is important to set the scene initially in the video about the history of technology in Worcester. After the "big picture" is established individual historical, technological events can be discussed. The reasoning for this method as described by Tischler is to magnetize the students so that the information conveyed takes a stronger hold in the minds of the students.

- **The Frameworks Curriculum**

Another important facet of this project is the Frameworks Curriculum as mentioned in the introduction of this proposal. As part of the Education Reform Act of 1993, Massachusetts has instituted the Frameworks Curriculum. The Frameworks outline guidelines for teachers in grades K through 12. The guidelines are the basis for the MCAS exam given each spring to public school children in Massachusetts. The Frameworks apply to all areas of study for school children.

This project concentrates on the Science, Technology, and Human Affairs section of the Science Curriculum. This section of the Frameworks relates how science and technology interact with society. There are several of goals to this section of the Frameworks.

One of the first goals is to show the impact of technology. That is how does technology affect the environment and our surroundings. This will be one

of the goals that is highlighted in this video. The Frameworks intend to show children that all technology has an effect on the world, both negative and positive.

Another goal is to show that technology is a changing process. What we thought yesterday is much different than what we think today and even what we will think tomorrow. Therefore it is important to educate children about the past, present, and future of technology. One of the main goals of this lesson is the past. This project is strives to educate children about how we have come to where we are currently.

Overall the Frameworks attempt to show students that technology is not just computers and space travel. Technology occurs in our everyday lives. And things that we may take for granted today were at one point considered to be leading technology. The lesson prepared as part of this project will address these goals set by the Frameworks Curriculum.

## PROCEDURE

Planned as some simple editing to an existing video, the production of this video as an IQP has developed into a much larger project as mentioned in the Introduction. The original IQP consisted of making edits to the Capital Campaign video produced for WPI by the Resource Group of Pennsylvania. As mentioned in the Introduction, Mrs. Schachterle, a Worcester schoolteacher, saw the original Capital Campaign video and thought it would be perfect to go along with the Frameworks Curriculum concerning science and technology. Because the Capital Campaign video was WPI specific, the original idea for this project was to make edits to the existing video to make it more applicable to middle-school children in Worcester.

After the Capital Campaign video was reviewed it was clear that it could be a perfect teaching tool. Although there were many edits to make on the video, it gave a perfect foundation about historical events regarding technology in Worcester. Not only was the content of the video useful, but the look of the video was also very impressive. Titles and fades moving across the screen created a video that was entertaining as well as educational.

- **Legal and Technical Issues**

It needed to determine from the Instructional Media Center (IMC), at WPI, what needed to be done in order to edit the Capital Campaign video. After discussing the video with Doug Thompson, Operations Manager for IMC, it was

determined that a completely new video would have to be produced. There were a number of issues, both legal and technical that lead up to this decision.

In watching the Capital Campaign video one can see that there is a great deal of footage that is not necessarily Worcester specific. The Resource Group acquired a great deal of the footage for the Capital Campaign video that was obviously not from any archives in Worcester. Later it was determined that these pieces of old film footage were from the Smithsonian Institute. From this point, the legal agreement between WPI and the Resource Group needed to be investigated.

Not only was there an issue regarding film footage, but also the problem of the music used in the Capital Campaign video. The Resource Group retains a library of music that is licensed to them, as does the IMC. Because of the license, there was going to be a problem using the music in a video other than the Capital Campaign video.

Because of the many legal issues that had come to light, as mentioned it was necessary to understand the contract between the Resource Group and WPI. Michael Dorsey, director of communications for WPI was the person who oversaw the development of the video. Therefore he was able to handle many of the legal questions that had been raised. At the time of the initial communication, Mr. Dorsey could not determine the exact nature of the agreement between the two parties. Therefore, he was going to get in contact with the Resource Group and then get back to me on the legal issues discussed.

Aside from these legal issues, there were also technical issues. As mentioned above the music was a legal issue. However, the music became a legal issue because of a technical difficulty. From information provided by IMC it was determined that the format of the Capital Campaign video did not allow a separation of the audio tracks. In other words, both the music and voice were mixed together on the actual tape; they could not be separated. As mentioned above, there was a great deal of WPI-specific information in the video that needed to be edited. Editing the film without a separation of audio tracks was going to be impossible. Because of the legal issues none of the audio used in the original Capital Campaign video could be used at that point.

As it turns out, the actual images on the screen were also going to be a problem. The Capital Campaign video was done in a format known as letterbox. This is the same format used on motion pictures shown in movie theatres. Because of the shape of the projection screen, letterbox is the preferred format for showing movies on screen, the original intent of the Capital Campaign video. At the time, IMC, they did not have the technology to edit the tape in this format.

The titles seen in the Capital Campaign video were also going to be a problem in editing. Like the audio tracks, the video tracks were also imbedded in one another. There was going to be no way to separate the titles from the images and video. In the editing process, this was obviously going to pose a problem.

Because of these technical issues it was determined that this IQP would have to be done from scratch. Now images had to be collected, a script had to

be written, and the video had to be produced and edited. Hence, the actual amount of work required for the project increased significantly in some respects. In other respects, it was going to be slightly easier to design a video from the bottom up. This way, the video could be designed to fit the needs of the middle-school children of Worcester.

To complicate this project even more, in a discussion with Doug Thompson relayed that the IMC would be installing a new routing switcher during the middle of my project. Therefore the video editing work would have to be completed either before or after this two-week period. The installation of a new switcher consisted of a complete teardown and rebuilding of the existing system. Fortunately during this time, IMC was also considering the purchase of an Avid Express editing machine. This new machine would negate the concern about the routing switcher issue due to its capability to be freestanding. The Avid Express editor is explained later in this chapter.

- **Video Content**

In order to determine exactly what the video should contain, the first few meetings with all the advisors consisted of brainstorming about the needs of the children. Mrs. Schachterle was very helpful in explaining what the Frameworks required and how her classroom had been affected by them. She was also able to give me some insight into how her students learn. Because one of the goals of the project was to develop this video to follow the Frameworks Curriculum, there was a great deal of discussion about what the Frameworks required. After

required. After these discussions a great deal of time was spent researching the Frameworks Curriculum. To explain this requirement of the Massachusetts Board of Education, not only current periodicals and the Board of Education web site were used, but also local teachers.

In discussions with the advisors of the project, it was determined that a video with no recognizable faces might be boring to the students watching it. We therefore determined that it would be beneficial to the success of the video to include some Worcester students in the video. The goal was to create a connection between the students watching the video and the issues in the video. By including a group of their peers, students watching the video would better relate to the various topics discussed. Students learn better by associating the activities they are doing with what is going on in their daily lives (Tishler, 1997). Therefore, by including people, their peers, from their daily lives, the students will relate better and thereby increase the learning from the video.

After discussing the contents of the proposed video, a list of topics discussed in the Capital Campaign video was compiled. As a result it was determined that there were fifteen different technologies discussed by the video, which pertained to former WPI students and therefore Worcester.

To the adult mind, fifteen topics did not appear to be overwhelming. The video showed each topic rather quickly and with little depth. However, it was the feeling of several of the teachers interviewed in this project that this many topics might be overwhelming to a young mind (Hatlee, 1999). Therefore, because the video was to be done from scratch anyway, the number of topics was reduced to

three. The decision to do so was reaffirmed through a discussion with the advisors.

The deciding of topics was not as simple as randomly choosing some issues to discuss. It deciding which topics were to be used in the video, it was important to ensure that the topics would be of interest to the students. As Chaille discusses, children learn by applying their current knowledge base to events happening around them. Therefore, by designing the video to discuss events that directly affect students' lives, this lesson is more effective.

Of the fifteen topics discussed in the Capital Campaign video, the author as well as the advisors decided that transportation and television were the most important to the audience (i.e. middle-school students in Worcester).

Transportation was chosen because it affects how people, including students, move from place to place within Worcester and around the world. Everyone in Worcester needs transportation. And the way transportation in Worcester has evolved provided an interesting series of events to show that technology really is an evolutionary process that affects our daily lives.

As mentioned above, television was another topic originally chosen for this video. Television plays an enormous impact in the lives of students today. As we know television has both positives and negatives. Regardless, we must acknowledge that it occupies a significant amount of time in students' lives. By showing the television as a technology that has evolved through the years, the goal was to motivate the audience to think critically about why it has evolved the way it has. Therefore television was the second topic chosen for the video.

The third and final topic chosen for the video was not originally included in the Capital Campaign video. The third topic was housing. In discussions with the advisors we determined that housing was also a key element in the lives of the students. Housing as a technology has certainly evolved from the early days of Worcester. For example, houses are no longer heated solely by fireplaces. Housing in Worcester could be shown as a technology.

We can also assume that housing is important to the students in Worcester. In order to show that technology exists in their daily lives, housing was chosen as another important issue.

- **Historical Research**

Once the topics for the video had been chosen, some preliminary research had to be done on each of these topics. Because of the level to which this video was to be shown, an in depth study of the history for each of these topics was not needed. In fact in many cases a brief overview of the topic would be sufficient. For instance it would be difficult for a middle-school student to comprehend minute details about how television electronics evolved. Therefore only overviews were necessary to cover the various topics.

Several resources were used to find information about the history of Worcester. Much research was done at the Worcester Room in the Worcester Public Library. The librarian of that room, Nancy Gaudette, proved extremely helpful and knowledgeable about the various topics included in the video being produced. Researching these topics was concentrated on books written during

that time period. Books such as Washburn's and Nutt's were essential in giving an idea of Worcester prior to this century.

To uncover more about the history of transportation in Worcester the Worcester Regional Transit Authority (WRTA) was used as a valuable resource. Cathy Archambeault, Sales and Promotions Director provided a wealth of insight about the early days of traveling around Worcester. She was also able to provide a number of images used in the production of the video.

The last source used was the Worcester Historical Society on Elm Street in Worcester. The librarians and other staff members were able to provide the information that was relevant to the video. The Historical Society was also instrumental in collecting images to add to the video.

- **Inclusion of Students**

Although the author had conceived ideas for the video, it was important to have input from the potential audience for the video. Therefore, the existing Capital Campaign video was shown to some middle-school students Worcester. Mrs. Schachterle offered her classroom as the initial testing ground for the video. At the same time that the video was shown to Mrs. Schachterle's class, a video of the children could be made in order to include them in the video.

It was logical to videotape the children answering questions about the three topics that had been determined to be important to their lives (See Appendix A.) The answers to these questions were very enlightening. The students knew very little and were not excited about anything regarding housing.

And in regards to television the students' only responses were that they could not live without it. However, the questions about transportation allowed for some very thoughtful answers, especially those questions about Dr. Goddard and his rockets. The children appeared to be very excited to talk about these topics.

As mentioned above, the Capital Campaign video was shown to the students to illicit their responses to it. Several questions were asked about the video (See Appendix B). Overall the students seemed to like the video and felt that the content was not too difficult to understand. Another question asked of the students was about the difficulty of the content of the video. In order to design a new video it needed to be understood at what level middle-school children could comprehend information. It can be assumed that they did not understand all the information that was given in the video. However, in discussions after the video the students did mention in detail many of the occurrences in the video. The most important point learned in showing the students the video was their interest in travel on earth and in space. These topics seemed to be most appealing to the majority of the students.

As previously mentioned the video screening and the interviews on camera provided very useful information for this project. Not only did the screening demonstrate the level that the students could understand the material, but also what excited them the most. Because of the session with the students it was necessary to rethink what was to be included in the video. As mentioned above, both the housing and television questions elicited responses that showed that the students were not highly excited about the topics. However, they were

extremely excited to learn more about transportation. This called for a refocus for the video topic.

- **Refocusing of the Video Topic**

There was a great deal of discussion in refocusing the topic for the video. One question that posed difficulty in determining the new focus of the video was whether it was more important to teach the students more about a topic they enjoyed or to teach them about a topic they were not enthused about but also did not know much about.

The topic of transportation was determined to be the one and only topic for the video for several reasons. Because of the lack of enthusiasm for the topics of television and housing, it was assumed that the students would enjoy the lesson less had the focus been on these topics. From personal learning, one can understand the idea that more fulfillment comes from a topic that is more exciting. Another reason for choosing transportation as a platform for discussing the history of technology was its ease. The history of transportation as a technology could easily be discussed in regards to Worcester. The history of transportation in the area is so vast that there are a number of topics within transportation that could be discussed. Therefore because the students were so enthused about the topic and it served as a perfect topic to discuss the history of technology the author decided to use transportation as the primary topic for the video and lesson.

The history of transportation in Worcester could extend far beyond the comprehension of middle-school students. Therefore the timeframe of the video needed to be limited. The video could have begun discussing the first roads into Worcester. A history this in depth would not only be far too confusing, but also would produce a video that would be far too long. Because the attention span of the average person is only about twenty minutes, an hour-long video would certainly be wasted on students.

- **Video Script**

Upon finishing the research in the area of transportation using the aforementioned resources, a script needed to be written for the video being produced. Therefore a script was created on an Excel spreadsheet consisting of four columns (See Appendix I). The first column of the script noted the approximate time it took to say the dialogue written in the third column. The second column of the script noted the visual used in the video. The visuals ranged from graphics and titles to still images and video. Obviously the video needed dialogue to accompany the visuals mentioned in the second column. Therefore the third column sited what was to be spoken while the visual was being shown. The final column gave "camera directions" for the visual. The camera directions were such things as fades, titles, and movement on still images.

The script was compiled two different ways. Often certain visual images were found that conveyed a particular point. Those images were set aside so

that they could later be added to the video. For these images, dialogue was created to coincide with the image. However, most often in the research there was dialogue that was useful for the video. After finding the dialogue for the script, images then needed to be found to coincide with that dialogue.

Once the plan for the video was set in motion it was decided that this video would be much more effective and helpful to the teachers if it was accompanied by a lesson plan. Because the goal of the video was to get students to learn about the history of technology, a full set of exercises needed to be included to make the learning more effective (See Appendices C-G).

- **Frameworks Curriculum Specialists Involvement**

Although by this point in the research the Frameworks Curriculum guidelines were understood by the author, it was important to consult with someone within the school system. Therefore Charles Campbell and Joyce Gleason were contacted. These individuals work in the technology education division of the Worcester School system. Both individuals agreed that the video was a tool that could be used to supplement the lack of educating that is being done in the area of history and technology. In this meeting they offered any help they could give at any point during the project. Both Mrs. Gleason and Mr. Campbell were anxious to see the finished product.

- **Creation of the Video**

Having the script written and some of the images and video already compiled the creation of the video was now just a series of steps. To the project's advantage, the IMC recently acquired an Avid Express video editor. This editor allowed a video to be produced in a non-linear format. Previously the video would have had to have been produced using several video tapes being dubbed to a master tape, in other words a linear format. However this new Avid system was able to take video, audio, and still images and convert them into a digital format. Each video, audio, and still became a clip, which were treated like ordinary computer files. These clips could easily be organized on a timeline, which became the actual video. The Avid editor significantly decreased the time required to produce this video. Because new ideas were constantly being developed for the content of the video, the Avid also allowed for images and video to be added after the entire timeline was set.

Because the Avid editor was new to the IMC, there was no one in the department trained on the machine. Therefore, in order to produce the video the author needed to understand the functions of the editing machine. Although relatively easy to use, there were some instances where the use of Avid Tech Support was required.

As mentioned, many of the visual images were compiled for the video. However, there were also a number of instances where dialogue for the script had been created but there was no visual images. Therefore, close to one

hundred images were compiled. Many of the images needed for the video had to be of Worcester. Therefore the librarians at the Worcester Historical Museum were consulted to acquire these images.

***Visual Images***

Images for the video were originally acquired using a flatbed scanner. This scanner made exact copies of the photographs and graphics only in a computer format. There were several problems using this method. The scanning of images requires several pieces of equipment as well as extra software. Using the scanner in the library required both a laptop computer and the scanner. This was not only cumbersome, but also distracting to others using the Historical Society's library. Another problem with this method was that the images contained a great deal of detail. In fact the detail created by the scanner was far in excess of what would be seen on a television screen. Also, high disk space is required when an image has great detail. Therefore, once images were acquired using the scanner they would have to be manipulated to decrease the image quality and file size.

Because of the problems using the scanner it was determined that the most practical method for acquiring images for this application was using a digital camera. The digital camera was lightweight and much less cumbersome than the equipment required in using a scanner. The camera was used to take images of the original photographs. Once all the images were acquired they were loaded into a software package called Paint Shop Pro®. This software

allowed the images to be cropped and resized. This software also allowed certain imperfections in the images to be reduced.

Within this project there were many images that did not have to be of Worcester. Therefore, generic pictures of cities and transportation methods could be used. For these images IMSI's Master Clips 202,000 was used. This software package consists of several thousand images that can be used for virtually any purpose.

Once all the images were compiled, they could be added to the timeline on the Avid editor. This process simply involved removing the images from the laptop computer used in acquiring of images and importing them in Avid's software interface. Upon completing this migration of images into the Avid system the timeline for the video could be laid out.

Laying the timeline required matching the times recorded on the script for each piece of dialogue to the picture. It was necessary to either extend or truncate pictures to fit the dialogue. This is also the point at which moving titles and other graphics for the video were inserted. The Avid machine allowed for the manipulation of two different video tracks. Therefore, images such as titles could be laid overtop of other images.

***Audio Recording***

By this point in the project, all the visual production was complete. It was still necessary, however, to dub the audio for this video. Since Professor James Hanlan had narrated the original Capital Campaign video it was decided that he would also be perfect for this production as well. Given that the script was

already created, recording the audio for the production was relatively simple. Professor Hanlan spent less than an hour in the recording studio of IMC. Professor Hanlan simply read from the script that had been developed earlier on in the project.

One of the best segments on the Capital Campaign video was the one created about Dr. Robert Goddard, the "Father of Modern Rocketry." The Resource Group did a particularly outstanding job with covering the history of Dr. Goddard. Therefore, it was wise to include the original Goddard section in this video production. And after meeting with the people from Resource Group permission was received to do so.

- **Testing the Lesson**

At this point both the video and lesson plan were complete. Essentially the bulk of the work in the project was done. However, it was unknown if this entire lesson was a valid one for Worcester students. This lesson needed to be tested to be sure that it had accomplished the goals set forth in the beginning of the project. It required testing by both the potential teachers who would be giving the lesson and the students actually learning from the lesson.

The lesson was discussed with four different teachers; two from the area and two from another state. Receiving opinions from different states would reduce possible biases. While the teachers from Massachusetts are well aware of the Frameworks Curriculum and would therefore be able to understand how the lesson adheres to the Frameworks, the out-of-state teachers would be able to

give an unbiased opinion of the functionality of the lesson. The feedback and results of the teachers' are discussed in the following chapter.

As mentioned above, it was also necessary to test this lesson on the potential students. Since this project was being completed in the summer, and before the start of school in Worcester, it was necessary to find a test site other than a classroom. The Recreation Director of the Friendly House, in Worcester was therefore contacted. And a meeting was set up to discuss the project and its need for some children to test the video being produced. The discussion of the showing of the video at Friendly House is presented in the next chapter of this project.

As mentioned previously, this project has evolved and changed greatly from the original plan of the project. Although the end result, a finished video, was known at the beginning of the project, the series of steps to complete that video was not yet known. Like many projects each new realization or discovery steered the project in a new direction.

# RESULTS

This project includes three result areas. First there is the result of the video and lesson plan produced. Therefore, in the first section of this chapter discusses the video produced. Included in the discussion of the lesson plan is the reasoning behind certain events within the lesson plan.

The second result from this project is the reaction from teachers regarding both the video and the lesson plans. As mentioned in the previous chapter, in order to validate the work on the project, it was important to receive feedback from those who might possibly use the lesson. Therefore, in the second section of this chapter the results from discussions with various teachers, which come from both the local area and other states, are discussed.

The third and final area of results is that of the students' reactions of the video and the lesson plan. Because of certain time constraints for this project, this lesson could not be tested in an actual classroom. Therefore as mentioned previously, the testing had to be done in the summer at Friendly House. Also, because of a time constraint at the testing site, Friendly House, the full lesson plan could not be used. Time allowed for only the video to be shown. The results from the students for this project could only be gathered from the showing of the video.

Because the audience for this lesson plan consists of two groups, the teachers and the students, it is necessary to look at the results of both groups. By the end of this chapter the reader will have a better understanding of the viability of this project.

- **The Lesson Plan**

Several middle-school teachers made many suggestions that were included in the final lesson plan. Many of the resources used from the literature search found in Chapter 2 of this project were also used in forming this lesson plan.

One of the most useful articles in forming the lesson plan for this project was Andrew Johnson's. As mentioned in the previous chapter, Johnson suggested the use of creative dramatics to facilitate learning (Johnson, 1998). In other words, getting the children deeply involved in learning and actually placing themselves in the time period of the learning can be very useful. Thus, the two writing exercises were created. The first of the writing exercises is "The Letter." This exercise asks the students to write a persuasive letter telling their cousins to come to Worcester during the time when their grandparents were their age. Johnson states that an exercise such as this stimulates critical and creative thinking for the students. This exercise also satisfying one another of the Frameworks Curriculum guidelines for writing, that of writing a persuasive letter.

The last exercise also allows students to place them in a situation different from their current one. The last exercise "The New Way to Travel" allows students to use their imagination to design a new method for traveling. This exercise brings out creativity in the kinesthetic learner. That is, those students who learn using a "hands-on" approach will find that this exercise aids in their learning.

One of the most valuable tools in the lesson plan is the KWL exercise. This exercise is valuable for both the students and the teachers. This exercise explained in the lesson plan (See Appendix E). This exercise is beneficial to the teachers because it allows them to assess the students learning throughout the lesson. Students list what they already know about the subject and what they want to know about the subject. This allows the teacher to understand the level of the students' understanding before the lesson as well as being able to tailor the lesson to the students' wishes for learning (i.e. what you want to learn?). The last question asks the students what they have learned after the entire lesson is given. This allows the teacher to assess what areas the students may be weak in and therefore where the lesson may need to be improved. This can be an excellent tool for both the teacher and the students.

- **The Video**

The primary goal for this project was to develop a video for students in and around the Worcester school system. As mentioned previously in this project, the video concentrates on the history of transportation as a technology in Worcester. This section of the project discusses the results of the production of the video.

As mentioned in Chapter III there was no need to delve deep into the history of Worcester. Overwhelming the students with great detail and many insignificant facts would defeat the purpose of the video. Therefore, the history used in this video is essentially an overview of the history of transportation in

Worcester from 1831 to the present. The video begins by setting the framework of what technology is. The narration begins by telling the students what technology is. That definition of technology is then applied to things in our everyday lives.

The video then moves to a discussion by a group of Worcester school children about how travel is different today than in the 1800's as well as how their grandparents traveled. The video progress from here to cover the actual history of Worcester.

The order chosen for the topics provided what seemed to be a natural progression from traveling in Worcester to traveling around the world and then on to traveling to other worlds. Trolleys begin the discussion of the history of Worcester's transportation. The trolleys were discussed in terms of moving around Worcester and the surrounding towns. The video then moved from the simple trolleys to locomotives, which allowed people to travel outside of Worcester. The discussion of locomotives is quite extensive and talks about many of the train lines that ran through Worcester as well as the stations used in Worcester. The final historical topic of the video is the advent of flight in the Worcester area. This section of the video talks about how flight came to Worcester and where it all began. The video ends with possible suggestions of how technology will change how we travel in the future. It leaves the students with a question about how they think travel will change due to technology.

One of the techniques used in the video was the use of rhetorical questioning. Often in the video the narrator would ask the viewer questions and

allowed him or her to think about an answer. This was an important technique to maintain the attention of the student/viewer. Had the video been developed as just a method for simply passing on information, the use of questioning would not be needed. However, one of the goals of the project was to get the students to think more about how technology occurs in their daily lives. Therefore the use of questioning would not only kept the students' attention, but also causes them to think critically about the history or transportation as a technology.

Another technique used in the video was the use of the students' peers. As a suggestion from Mrs. Schachterle, a group of fourth graders was videotaped answering questions about transportation and technology and included in the final video. The goal was to make the students watching the video feel more connected to the video because of their peers. Showing other elementary school students participating in the video allowed students to see that technology is part of their own lives.

Another important technique used in the video and stressed by the Frameworks Curriculum guidelines, is the explanation that all technology has a negative side. In other words with every new innovation come the problems associated with that innovation. This was important to mention because not only students but also many adults feel that new innovations solve problems, which is true. However, many forget that technology often creates newer problems. Because one of the goals of this lesson and the Frameworks Curriculum guidelines is to give students a sense of ownership for new technology, it is

important to make them realize that this new technology may often cause new problems.

- **Teacher Feedback**

As previously mentioned, several teachers helped in the process of evaluating this lesson. Several teachers were instrumental not only in developing the content for the lesson but also in the final review of it.

The teachers who helped to evaluate the lesson in the project were overall positive about the result. All the teachers surveyed were impressed with both the lesson plan and video, especially from someone who had no prior experience with elementary education.

As mentioned previously, teachers from various geographic areas were used. Teachers from an array of areas would provide more unbiased opinions about the lesson. From the Worcester school system Mrs. Bonnie Hatlee, a fourth grade teacher from Thorndike Elementary was surveyed. Mrs. Hatlee provided an opinion that would be more specific to Worcester, particularly in terms of what interests Worcester students.

Although it was important to have an opinion from teachers within the school system, the author felt that teachers from outside the system would provide better feedback about the lesson as a whole. Therefore Ms. Kelly Runstrom, fourth grade teacher, Framingham school system; Mrs. Karen Newberry, sixth grade teacher, Plymouth Meeting, Pennsylvania; and Dr. Susan Bitner, reading specialist, Upper Moreland school district, Pennsylvania were

chosen. These teachers provided some insight into the positives and negatives of the project and offered some suggestions as to what could improve the entire lesson.

It was important that the teachers being surveyed in the project see exactly how the lesson would be presented to students. Therefore, rather than just showing the video to the teachers, they read the full lesson plan and activities first before viewing the video. The lesson plan (See Appendix C) outlines how the entire lesson should be presented to students as well as reasoning behind each exercise provided for the students. Once the teachers had thoroughly read the lesson plan, they viewed the video.

Upon completing the video each teacher was provided with a survey (See Appendix H). This survey asked general questions about the teachers' thoughts on the video. The first question asked regarded the overall all lesson in order to assess the teachers' overall impression of the video. All teachers provided positive responses to this question. Although not conferencing with each other, each teacher agreed that it would be a positive experience for students. In particular, Karen Newberry discussed the fact that the objectives specified in the lesson plan were met by the activities in the lesson plan and the video.

After asking the general question about their thoughts on the video more specific information was asked. What in particular was positive about the video and in their eyes what made the video successful was of interest to project. This would provide more specific information to indicate strong areas of the video.

Each teacher felt that there were some very positive features to the

lesson. Karen Newberry mentioned that the use of other children in the video would be a positive experience for the students. She felt that seeing their peers incorporated into the video would bring the issues discussed in the lesson closer to them. Both Susan Bitner and Bonnie Hatlee agreed that the video made clear points about topics that would be easily understood by students between the third and sixth grades. They both felt that the pace for the video was appropriate for a wide range of student ability levels.

It would be unrealistic to only ask for positive feedback in a project such as this. Therefore the teachers were asked what they saw as possible negatives or areas where the video may have failed. These mentioned negatives serve as a basis for the following chapter, which discusses areas where the lesson can be improved.

As mentioned above, overall the teachers had many positive comments about the video. In fact it was difficult to get feedback about negatives of the video simply from the survey. However in the survey about the video, the teachers were asked what they did not like about the video. Karen Newberry mentioned that the speaker's voice was monotone. Although this statement was valid, this was not the fault of the speaker. Because the script was recorded independently from the visuals shown on screen, the speaker was unaware of what images were displayed and therefore where voices inflections should occur.

Dr. Bitner mentioned in her discussion of the video that a few sections tended to move quickly from one visual to another. She felt that there were a few transitions in the video that could be done smoother with a visual transition and a

fade in or out of voice and music. Part of this problem existed due to the technical issues involved with the video. Often in creating transitions with the video, images would not align themselves correctly. Therefore, smooth transitions could not be rendered in certain areas.

Aside from these mentioned issues, Bonnie Hatlee and Kelly Runstrom had no further comments.

Once the teachers had discussed their thoughts on the video itself, the project also required their feedback on the lesson plan, a key component of the project. The lesson plan greatly increased the effectiveness of the entire lesson and therefore a professional opinion about it was welcomed. Like the video, the teachers were asked both about what they liked and then disliked about the lesson plan.

Because several teachers aided in forming the lesson plan and many current periodicals were used, the techniques used in the lesson plan agreed with current teaching methodology. All teachers agreed that the lesson plan was very thought provoking for the students. They felt that the lesson plan added to the students learning because the exercises actively included the students. The lesson plan placed the children in varying time periods, which allowed them to ponder different experiences by the people living in those times.

Dr. Susan Bitner was very excited to see the **KWL** exercise. This exercise asks the students to discuss their knowledge throughout the lesson. Dr. Bitner felt that this was a powerful tool for both the teachers and students throughout the entire learning process.

In a discussion with Ms. Kelly Runstrom about the exercises, she was very pleased to see the interactive activities about writing a letter and designing a new method for transportation. She felt that these exercises would evoke creativity in the students and allow the students think critically about the material in the lesson.

There were practically no negative responses to the lesson plan. The one problem discussed primarily by Dr. Bitner was the specified length of the lesson plan. In the original lesson plan, two hours were allocated for the completion of this lesson. After many years of teaching, in Dr. Bitner's opinion this would not be nearly enough time. Because of this discussion the author changed the total time needed for this lesson to one day.

The second page of the survey for the teachers asked a series of yes or no questions about the format of the video (See Appendix H). These simple questions asked about the content, level, and length of the video. All the teachers asked in the survey checked yes on all the questions except for the length question.

- **Student Feedback**

Like the teachers' responses to the lesson plan and video, so too were the prospective students' responses positive. As mentioned in the previous chapter, the results for this project were gathered during the summer when school was not in sessions. Therefore, it was necessary to test the lesson at place where students tended to congregate during the summer. It was decided that the

Friendly House on Wall St. in Worcester would be the ideal place to test the lesson.

Originally the plan was to test not only the video, but also the lesson plan. However, the testing of lesson plan was dropped for several reasons. First, after the discussion with Dr. Bitner, it was determined that the lesson would be too long. Not enough time would be allocated by the Friendly House to give the entire lesson. Another reason for not giving the full lesson is the timing. It would almost be impossible to get an accurate opinion from the students during the summertime. Finally it was important that a certified teacher should deliver this lesson plan.

For the student feedback, similar questions were asked of students to those asked of teachers. And as mentioned above, most of the responses to the questions were positive.

The first question asked was about the overall opinion of the video. The author wanted to know from the students what they thought of the video as a whole. The actual responses from the students when asked ranged from "good" to "it was okay." However after observing from the back of the room, it was determined that these answers were not completely honest. From the back of the room it was noticed during the video that there was a great deal of fidgeting, sighing, and every once in a while someone whispering "when is this going to be over?" Therefore it can be assumed that part of the responses given to this first question were simply polite ways of saying that the students really did not care much for the video.

It was important to understand approximately how effective the video had been in communicating its message. Therefore the students were asked what in particular they recalled from the video in order to uncover what point "stuck out" in the students' minds. It was a surprised to discover just how much detail the students were able to recount about the video. In particular the students recalled their peers talking about technology and transportation. As with the initial interviews at the Grafton Street School, the children were excited to hear about the rockets and Dr. Goddard.

Like the teachers it was assumed that the students would have things they liked and disliked about the video. By uncovering what these likes and dislikes applicable changes could be made to the video better. Therefore the author talked with the students for a while about these areas. Among the topics the students liked were Union Station, rocketry, and the trolleys. The students were able to talk in some detail about each of these topics covered in the video. When asked about their dislikes, the students' main dislike was the use of black and white pictures. We live in a world of colored images and this was certainly evident in conversations with the students. The same responses were received from the students at the Grafton Street School when they were shown the Capital Campaign video.

In order for the students to appreciate the use of black and white pictures an explanation should be given to them. Students should understand that those pictures were taken in the past at a time when black and white was "state-of-the-art," like color photography today. It should be suggested to the students that at

some point in time people may feel that color photography is an old technology and there will be some new type of photographic technology available. This is yet another area where students can explore the evolution of technology.

Although the discussion above suggests otherwise, the students all responded that they did not feel the video was too long. As mentioned, it was observed standing in the back of the classroom that many of the students appeared to be bored and indifferent. Had this video been shown during regular school time, it may have received much different responses.

In terms of comprehension, the students seemed to have no problem with the video. Their ability to describe certain topics in detail proved that their level of understanding was quite high for this video.

Overall the video and the lesson plan received positive feedback from both the students and the teachers. This lesson could be a great success and a useful tool for teachers in Worcester and the surrounding area. It is realized that there are some improvements that could be made, which are discussed in the following chapter.

## FURTHER RESEARCH AND DEVELOPMENT

Despite the long hours and hard work there are areas of this project that could be improved. It would be foolish to believe that the perfect tool for teachers in Worcester had been developed as a result of this project. Based on the surveys with the teachers, interviews with the children, and personal perceptions, this section discusses several areas where the lesson could be improved.

One of the areas for improvement is the use of stills in the video. After watching the video several times it can be seen that the use of stills was tiring. The still images on the screen made the video somewhat stagnant. There are several ways that this could remedied. One method for reducing the stagnant images on the video would be to use more movement on the still images. Currently there are a few images in the video where a still image was taken and it appeared that a camera moved around the still image. Because this was a relatively easy fix, the author was able to add more movement to the final video production. The final video shows more movement on still images than previous versions.

Another solution to the problem of stills is the use of more footage. Although there was very little film footage of early Worcester, generic film footage could be used in certain areas. Similar to the Capital Campaign video, film footage from a random city, train station, or airport could be used. In truth, it makes no difference to the viewer if the footage is originally from Worcester or not.

In addition to the previous suggestions, yet another idea would be to include footage of the narrator. The video would be more interesting to the viewer if the viewer knew what the narrator looks like. Without knowing what the narrator looks like the narrator is set apart from the viewer. This is similar to talking on the phone with someone. Although speaking with someone on the phone can provide all the information a person might need, often direct face to face contact provides for better communication.

The length of the video may also be a problem. Originally, the goal was to make the video ten to twelve minutes long. The first draft of the video produced an eighteen-minute video. Although no one commented that the video was too long, it was assumed that the video lost the attention of some of my viewers. When individuals (teachers, students, & others) watched the video body language was noticed. People often tended to shift and move, which is a sign of indifference.

Because of the length of the video, efforts were made to reduce the overall length. The discussion of trains of Worcester was originally several minutes long. After the feedback from the audience several minutes were eliminated. There was also addition footage of the students discussing methods of transportation that was cut from the final video.

As mentioned in the discussion about the results of the video, it was determined that a great deal of detail was not necessary to convey the desired message to the students. The fear in detail was that it would confuse a significant number of the viewers. After reviewing this video it was found that at

times it might have lost many viewers in the details. A lot less detail could have conveyed the same message.

This extra detail was reduced when the video was shortened. As mentioned above, a significant amount of information about the trains in Worcester was reduced in the final edit.

An idea that could be developed further for the lesson plan that was suggested by several teachers is the idea of bringing this lesson into the home. Students' parents could participate in this lesson with their children. In this lesson children could be encouraged to discuss what life was like for their parents or grandparents. Students could report back to the class their findings about what was different in past generations. Another idea that could be further developed is that of a family tree. Students could fill in the names on a family tree. By each name, the student could site some sort of technology that was new to that time period. Bringing the lesson in the students' homes could be advantageous to the overall success of the lesson.

Currently this lesson is a viable teaching tool that complies with the Frameworks Curriculum guidelines for Massachusetts. This tool provides a foundation for more tools like it to be developed for similar purposes. Although very useful now, this tool could be improved with some minor changes as suggested above.

## CONCLUSION

This project has evolved significantly from where it once began. What started as a simple editing job turned into a complete lesson for middle-school students.

Because of the evolution, this project has become more valuable to both the students and the teachers. The lesson developed in this IQP provides Worcester students with the opportunity to learn about the history of their city. This lesson gives teachers of Worcester a complete lesson including a video and several activities for their students.

This project was an overall success. Positive feedback was received on both the video and the lesson plan. Hence, this IQP has served its purpose in fulfilling a societal need regarding technology.

## APPENDIX A

Questions for the Children

**Questions for Children:**

***General:***
- What is technology?
- How has technology changed your life?

***Transportation:***
- How did your grandparents travel? In Worcester? Around the world?

***Television:***
- What would life be like without television?
- When did television start?
- What was television like in the early days?

***Housing:***
- Why did people build triple-deckers?
- How did people heat their homes 100 years ago?
- Why are older houses closer to the street?

**What do children learn?:**

***Transportation:***
- How people traveled before airplanes
  - Ships
  - Railways
- What transportation was like in the early days or Worc.
  - Street cars
- What were the road systems like in the first half of the century
  - In Worc.
  - Throughout country
- How evolution of transportation has made their lives better (or worse)

***Television:***
- How people communicated in the mass media sense before television
  - News
  - Ideas
- Realize the impact of television on society
- The history of the media form most people use everyday

***Housing:***
- Basic economic principles
- Why this was so different in Worc. than in other cities
- How housing of that time period has changed to suit today's needs

## APPENDIX B

Post-Video Questions (Children)

## POST-VIDEO QUESTIONS (CHILDREN)

- What were your overall impressions?
- What do you remember most about the video?
- What did you like about the video?
- What didn't you like about the video?
- Was the video too long?
- Could you understand everything the video talked about?

## APPENDIX C

The Lesson Plan

| | |
|---|---|
| **Lesson:** | Transportation as a Technology in Worcester |
| **Time Req.:** | 1-2 Days |
| **Areas:** | ▪ Science and Technology<br>▪ Social Studies<br>▪ English/Writing |
| **Objectives for students:** | ▪ Be able to discuss timeline of when events in Worcester happened.<br>▪ Be able to understand and give examples of technology as part of our everyday lives.<br>▪ Be able to understand and give examples of technology also having a negative impact at times.<br>▪ Be able to develop their own ideas about the future of transportation |
| **Materials:** | ▪ Transportation video<br>▪ KWL<br>▪ The Timeline<br>▪ The Letter<br>▪ The New Way to Travel |

**Description:**

This lesson is designed to address the Science and Technology section of the Massachusetts Frameworks Curriculum. Massachusetts wants to show students that there is not only technology in our daily lives, but also that there is a history to technology. This lesson addresses these issues.

This lesson is centered on the included video. Because transportation is such a significant part of students' lives and it has a deep history, especially in Worcester, it is a useful topic to illustrate the above issues to the students.

The video included gives a brief history of transportation in Worcester from the 1830's until the present. Included in the video are topics such as the trolleys, railroads, and airplanes in Worcester. All of these methods of transportation have played significant roles in the growth of Worcester.

Along with the timeline, the video stresses the chronology of transportation events that occurred in Worcester. One goal of this lesson is to give students an idea of the timeframe in which certain events in Worcester happened. The video also stresses that technology often has a positive impact as well as a negative one. The video leaves the students with questions about how the future of transportation will develop.

## Chronology of Lesson:

This lesson not only includes the video, but also activities to supplement the students' learning. These other materials are to be used throughout the lesson.

### KWL

The first suggested activity for this lesson is the KWL sheet. This sheet will be used throughout the entire lesson. It will also be used to assess the students' knowledge of the subject matter as well as the students' goals for the lesson.

The KWL sheet is divided into three columns. The first column asks the question "What do you know?" Before the video is shown, possibly a few days, the students should be asked to write brief statements about their current understanding of the history of transportation, not only in Worcester, but also in general.

The next column asks what they would like to learn about transportation. This gives the students ownership in the lesson, therefore solidifying many of the points made. Both this column and the first column allow the teacher to tailor the lesson to the students' needs and wishes.

The last column asks the students what they have learned from this lesson. By having the students write some ideas and facts about what they have come away with the teacher can assess the points where there may be gaps in the learning. The students should fill out this column after the entire lesson is complete.

### The Video

Prior to the showing the video the teacher may want to develop a discussion regarding the history of transportation in Worcester in order to stimulate students' thoughts. This video should then be shown. It may be beneficial to the students to show the more than once.

### The Timeline

The timeline should be used throughout the second part of the lesson. Depicting the various significant events in Worcester's transportation history, the timeline is a useful tool for the students in the following exercises.

**The Letter**
The letter is an exercise that requires the students to use both what they have learned from the video as well as their writing skills. The idea of the letter is that it sets the students in teh time period of when their grandparents were their age.. They need to write a letter to a cousin, convincing them to come to Worcester. The letter should discuss why they should visit Worcester and how they should travel to get here.

**The New Way to Travel**
This exercise allows the students to use their creative skills combined with the knowledge gained from the video. Within the Frameworks Curriculum there is a requirement that students design some form of technology, this exercise has been developed.

For this exercise the students place themselves one generation forward, that is when their children are the age they are now. The students are to design a new method of transportation or improve an existing one. One generation was used so that the students' responses to the exercise are not completely outlandish.

This exercise may provide an opportunity for group work, if desired by the teacher. Within small groups of three to four, students should brainstorm some ideas about the exercise. Once the group comes up with some ideas, more formal ideas and plans can be written. Once all groups have completed this portion of the exercise, each group should make a presentation about their design to the rest of the class.

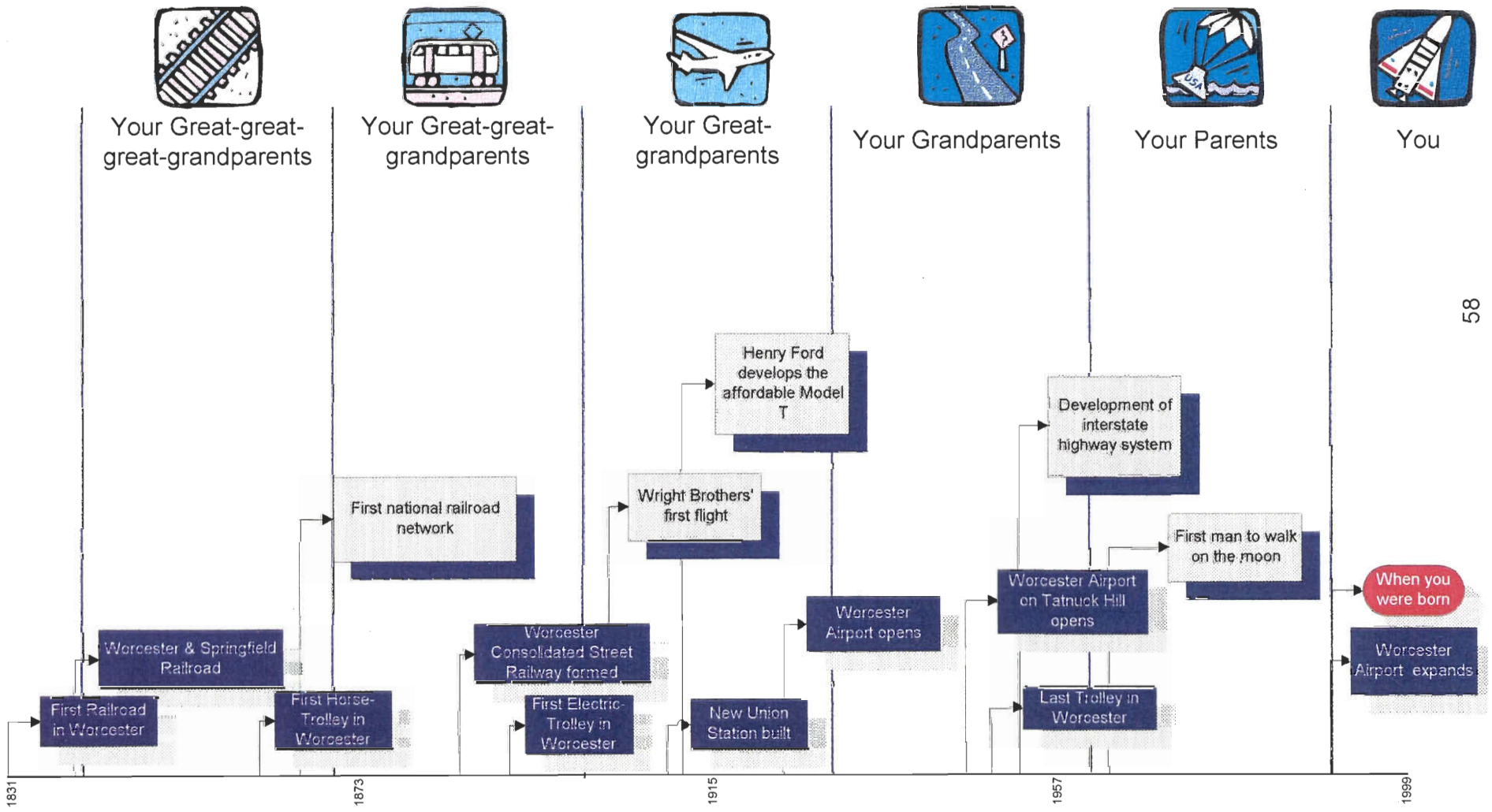
***NOTES:***
The KWL, Timeline, Letter, and New Way to Travel should be photocopied and distributed to the students.

## APPENDIX D

The Timeline

# The Worcester Transportation Timeline
# 1831-1999

This timeline shows transportation events that happened in Worcester from 1831 until today. The blue colored events are ones that happper in Worcester. The gray colored events were very important historical events, but they did not happen in Worcester.



## APPENDIX E

KWL

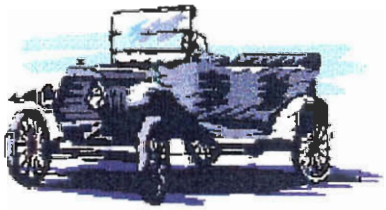
| What do you know? | What do you want to learn? | What have you learned? |
| --- | --- | --- |
| | | |

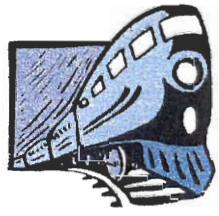
## APPENDIX F

The Letter

## The Letter

Now that you have watched the video, you know how people traveled in and around Worcester. The trolleys, trains, and airplanes all helped people travel in Worcester. Now imagine that you are living in Worcester around the time that your grandparents were your age. Write a letter to your cousin who lives in England. Tell you cousin why he or she should come to Worcester, and how he or she should get here. Think of all the methods of transportation available in Worcester during that time. Use the timeline to help you.



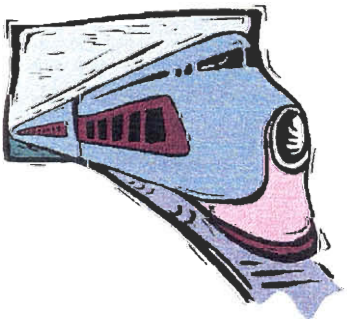


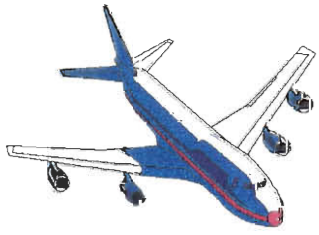
## APPENDIX G

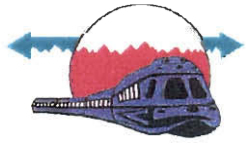
The New Way to Travel

## The New Way to Travel

You saw in the video the ways your grandparents traveled around Worcester and other places when they were your age. Now imagine that it is 20 years in the future. Many of you will have children of your own. Think about improving an existing way of traveling such a better engine in a car. Describe how you and your children travel around Worcester and the world.







## APPENDIX H

Lesson Survey

## Lesson Survey

1. What was your overall impression of the video and lesson plan?

2. What did you like in particular about the video?

3. What didn't you like about the video?

4. What did you like about the lesson plan?

5. What didn't you like about the lesson plan?

**Please circle one and comment if appropriate:**

Was the lesson age-appropriate (3rd to 6th grader)? **Yes** **No**
**Comments:**

Was the lesson too long? **Yes** **No**
**Comments:**

Was the content interesting? **Yes** **No**
**Comments:**

Was the lesson plan easily understood? **Yes** **No**
**Comments:**

Were the exercises appropriate for the grade level? **Yes** **No**
**Comments:**

**Please write any further comments on the back.**

## APPENDIX I

Script

| | Visual | Dialogue | Directions |
|---|---|---|---|
| 7 | Main<br>Old City Street<br>Shaped our world | "Technology is not how it was in parents or grandparents day. Technology has shaped our lives." | |
| 4 | Computer<br>Space Travel | "Technology is more than computers and space travel." | |
| 7 | Water<br>Jet (sunset)<br>Highway (night) | "Technology affects our daily lives. From the water we drink, to how we move from place to place." | *Fade from picture to picture* |
| 3 | Question Graphic<br>Video footage of children (v) | "What is technology?" | |
| | Definition | "While science tries to understand the natural world, technology tries to solve practical problems." | |
| 13 | | "It is important to look at how technology is different today than in the past. We're going to look at how technology has changed in Worcester over the past 150, particularly in terms of transportation." | |
| 10 | Jet (landing) (p)<br>Horse & cart (v) | "Transportation in Worcester is much different today than is was 150 years ago. There were no buses or airplanes when Worcester began." | *Fade from airplane to horse drawn carriage* |
| 3 | How is it different.copy.01<br>Video footage of children (v)<br>What is technology.copy.01<br>Video footage of children (v) | "How did your grandparents travel?" | |
| 8 | Electric trolley Conductors (p) | "Many people did walk and ride their bikes around Worcester. But did you know there were once trolley cars in Worcester?" | *Pause to show all pictures* |

| | | |
|---|---|---|
| 12 | Street | "The first trolley tracks were laid in Worc. by the Worcester Horse Railroad Co. in 1861. Initially the trolley ran from Lincoln Sq. to Main St. and were powered by horses." |
| 10 | Horse Trolley 1 | "People loved these horse-powered trolleys. Although the trolleys moved on 6 miles per hour, it allowed many people to travel all over Worcester for just 5 or 10 cents." |
| 10 | Snow covered tracks | "These trolleys weren't without problems. In the winter, the horses would have trouble making it up the long, snow-covered hills. Extra horses had to be added to make it up these hills." |
| 14 | Horse | "Another problem the trolleys faced was manure! The WHR owned 200 to 300 horses, which could produce 10 lbs. of manure a day. The company faced the problem of what to do with all that manure" |
| 8 | WCSC | "By 1885 the WHR merged with another trolley company and became the Worcester Consolidated Street Railway Co." |
| 18 | Trolley (Front St.) | "Due to all the problems caused by the horse-trolleys, Worc. Mayor Harrington began to look for a solution in 1890. In March of that year he visited Boston and Lynn to see their new electric cable cars. And by 1891, Worcester saw its first horseless cable car." |
| 18 | Trolley (Spencer) | "With the advent of the electric trolley car, also came the expansion of the existing tracks. The WCSR expanded its trolley lines all over Worcester county. New trolley lines connected Worcester with Shrewsbury, Leicester, Millbury, Clinton, and Holden." |
| 5 | trolley2 | "People could even take the 2 hour ride to Boston for just 85 cents." |
| 6 | Trolley (2 conductors) | "These new electric trolley cars were much cleaner and much faster than the old horse-drawn trolleys." |

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|---|---|---|---|
| 25 | oldunion left front Street | "Like the horse-drawn trolleys, these new electric cars were not without their problems either. These new trolleys were supplied power by cables that ran above the trolleys. These cables were often considered to be eyesores. Another problem was the tracks embedded in the cobblestone streets. The tracks created poor driving conditions in both bad and good weather. Can you think of any other problems that might have been caused by these electric trolley cars?" | *Pause on picture to think about question* |
| 16 | Trolley (W & Web) PVK00257.jpg | "The trolleys began to decline in the early part of this century. The automobile allowed people to travel the same places as the trolley, but whenever they wanted. By 1930 only 56 miles of trolley tracks remained from the 300 miles that once existed." | *Fade from trolley to empty tracks* |
| 11 | Electric trolley with winter eng | "By the end of W.W.II in 1945, most of the trolleys were gone from Worcester. The last trolley made the Cherry Valley run on Dec. 31, 1945." | |
| 10 | PVK00247.jpg | "The trolleys were a great way to travel in and around Worcester and the surrounding towns. But Worcester and its many industries needed to expand beyond the county."<br><br>Talk about Worcester as a leading industrial power in middle 19th century. | |
| 7 | State Map<br>US Map.avi<br>World | "As an industrialized city, Worcester needed to move both goods and people throughout the Commonwealth, country, and the world." | *Fade between different maps* |
| 8 | C0000442.jpg (p)<br>Locomotive Windham | "In the early part of the 19th century steam locomotives began to pop up throughout the United States. Worcester was no exception to this trend." | |
| 6 | C0001094.jpg (p) | "These early trains barely resembled the high-speed trains and subways of today." | |

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| 10 | Locomotive on Turner (p) | "The first train in Worcester received its charter in June of 1831. And 4 years later, 40 miles of tracks connected Worcester to Boston." | |
| 7 | Locomotive short one | "This line was expanded 4 years later, in 1839, to link Worcester with Springfield." | |
| 11 | Foster Street (outside) | "Soon railroad lines began connecting Worcester with other cities all over the state. Between 1840 and 1871, 5 railroad lines opened throughout Worcester." | |
| 3 | | "The Norwich & Worcester RR" | *Graphic of 1840 imbedded* |
| 3 | | "The Providence & Worcester RR" | *Graphic of 1847 imbedded* |
| 3 | | "The Fitchburg & Worcester RR" | *Graphic of 1850 imbedded* |
| 4 | | "The Boston, Barre, & Gardner RR" | *Graphic of 1871 embedded* |
| 3 | | "The Worcester & Nashua RR" | *Graphic of 1877 imbedded* |
| | | Talk about the importance of railroads to industry in Worc. | |
| 15 | Old union indside<br>old union left front | "These various trains left from several depots scattered around the city. Realizing that these trains would be more efficient if they came through a central station, the city built the Union Depot in Washington Sq., in the later half of the 19th century." | *Fade between various stations, then hold on Old Union Depot* |
| | old union people walking<br>old union 2 | "The Union Depot allowed people to make connections all over the world. Trains leaving from Union Depot would travel to Boston and New York where people could board ships bound for other countries." | *Fade between pictures* |

| | | | |
|---|---|---|---|
| 15 | new union construction | "By the early 1900's, the Union Depot began to decay. It was time for a new station to be build. In 1910, Worcester completed the New Union Station, located just across the street in Washington Sq. The original building still stands today." | |
| 9 | newunion2<br>newunion left side view | "From this station people traveled to and from Worcester to places all over the world. Trains rolled through Union Station for most of this century." | |
| | train wreck<br>Train wreck rolled | "Trains allowed people from Worcester to travel all over the country. Like all technology, the trains were not problem free. Often times trains would derail, or even explode!" | |
| | Union in decline | Talk about the decline of trains in 60's & 70's including decay of Union Station. | |
| 6 | C0000391.jpg | "While the trains in Worcester were on the decline, a new era of transportation was being born." | *Slowly fade from black screen into image: imbed "Airplanes" over image* |
| 8 | B20965.jpg (12)<br>B20966.jpg (12)<br>B20968.jpg (12) | "The age of flight, launched by the Wright brothers 24 years earlier, came to Worcester on Oct. 12, 1927." | *Fade between 3 photos* |
| 11 | Houses<br>Whittall field | "The Worcester Airport actually began in North Grafton, on a site known as Whittal Hill. Although the site is now covered with houses, 70 years ago it was booming with excitement." | *Fade from new picture to old* |
| 8 | Absurd | "The idea of an airport in Worcester was thought to be absurd for quite some time. One publisher was quoted as saying, 'Who needs and airport anyway?'" | |

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|---|---|---|---|
| 18 | John Whittall<br>George Booth | "In order to get the airport build in Worcester, James Whittall needed to get some of Worcester's movers and shakers involved. Whittall teamed up with people like George Booth, editor of the T&G, John White, president of Worcester Bank & Trust, and George Jeppson, president of Norton Co." | *Fade between photos: imbed names in images* |
| 9 | Whittall field | "With the support of these 3 men and $50k, which was raised in just 3 weeks, Worcester Airport Incorporated was formed. | |
| 17 | B6826.jpg (12) | "The most exciting moment in this airport's history came when a 19 B-17 bomber pilot became disoriented and had to land on this small grass strip. 90 truckloads of gravel had to be brought in to smooth the ruts made in the runway by this gigantic plane." | |
| 17 | Worcester Airport (fence)<br>Worcester Airport (front)<br>Worcester Airport (right) | "The airport on Tatnuck Hill, known then as the Battery B field, was not opened as an airport until 1946. With the increase in air travel in America, it was obvious that the Whittall Field was not adequate. New runways, and more hanger space needed to be added." | *Fade between photos* |
| 23 | Map of Worcester's relation to Western NY (g) | "This new airport on Tatnuck Hill expanded the boundaries of Worcester's air travel. Because of the new runways larger planes could be flown in and out. Northeast Airlines began service to NYC in May of 1946. And Mohawk Airlines allowed people to travel all the way to Albany, Rochester, and Buffalo, NY in 1953 when your grandparents were about your age."<br><br>Talk about decline of Worcester Airport. | |
| 13 | Goddard | "While many people in Worcester were being transported by trains, then cars, and finally planes, another individual was developing a new way to travel. Robert Goddard was developing a way to travel far beyond anyone's imagination."<br><br>Talk about Goddard and space exploration. | *Close on face and zoom out: imbed name in photo* |

| | |
|---|---|
| | "Transportation in Worcester had changed so much over the past century." |
| Trolley<br>Bus | "The technology of transportation in Worcester has allowed us to travel in and around Worcester." |
| Train (modern) | "Around the country" |
| Airplane | "Around the world" |
| Other Worlds | "And even to other worlds." |
| Cars<br>Engine | "The technology of transportation can only improve. Electric cars and more efficient engines will reduce pollution in the coming years." |
| Concorde | "Planes will fly faster and farther, allowing you to travel anywhere in the world in a matter of hours." |
| Train (high speed) | "High speed trains such as the new one that will connect Boston with Washington DC, will allowed more people to travel in less time." |
| Collage | "In the coming years there will be improvements on old technology as well as completely new ideas for transportation. How do you think we will travel tomorrow?" |

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