

Summative Evaluation of
Everest

An IMAX[®] Dome Film and Associated Educational Resources

Student Audience Study

Report for

McGillivray Freeman Films

Laguna Beach, California

by

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Executive Summary Student Audience Study

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INTRODUCTION

With major funding from the National Science Foundation and sponsorship by the Everest Film Network, MacGillivray Freeman Films has produced an IMAX® Dome film titled, *Everest*. The film, with a runtime of approximately 40-minute, follows a team of world-class mountain climbers as they journey to the summit of Mt. Everest. The summative evaluation reported here focused on the following major outcomes:

- To what extent did *Everest* appeal to middle school viewers?
- To what extent did the film achieve its intended viewing goals? For example, did students acquire knowledge about science, especially with regards to Mt. Everest, plate tectonics, and acclimatizing?
- Did the implementation of school-based activities prior to viewing affect outcomes?

METHOD

A quasi-experimental pretest/posttest nonequivalent comparison group design was used with middle school students to evaluate the film and ancillary schoolroom activities. Intact school classes were assigned to one of two treatments: Viewing the film only (FILM) and viewing the film after doing related activities (ACTIVITY + FILM). The treatment groups did not differ significantly with respect to the classifications of gender, or ethnicity.

Five days prior to viewing the film, all students in the sample completed a pre-viewing questionnaire. The following day, two classes from each of three participating schools read the Introduction (Pages 1-3) and completed four predetermined activities contained in the *Everest Teacher's Guide* to examine their impact on viewer learning outcomes.

Four days following students' engagement in related activities (described in the Procedure section of the report), all students in the sample from each of the three participating schools visited the Boston Museum of Science and viewed *Everest* in the Mugar Omni Theater. The following day, all students completed a post-viewing questionnaire. A follow-up teacher interview was conducted via telephone.

DEMOGRAPHICS

Three middle schools, who were registered to view *Everest* during a one week period in April, 1998, were contacted about participating in the study. A total of 225 students participated in this study. The first middle school provided 104 seventh-grade students. The school district reports that 85.6% of its graduates go to college, the average per household income is \$66,373. The second middle school provided 37 seventh-grade students. Reportedly, 67.3% of the school's graduates go to college and the income of households is \$31,813, on average. The third middle school provided 84 sixth-grade students. About 65.6% of its graduates continue on to college and the average income for households in the district is \$46,946.

Of the 225 student participants, 46.7% are female and 53.3% are male. With regard to ethnicity, 89.3% are white and 10.7% are minority. Prior to viewing the film, 64.9% of the students reported that they were “very” or “moderately” interested in learning about Mt. Everest. Another 25.8% indicated they were “a little interested” in learning about Mt. Everest and 9.3% reported not being interested at all. Of the student sample, 20.9% indicated that they knew “a lot” or “moderate amount” about Mt. Everest, prior to viewing the film. In contrast, 8.4% of the students reportedly knew nothing about Mt. Everest.

SUMMARY OF FINDINGS

Extent to Which *Everest* Appealed to Student Viewers

Of the 225 student viewers, 73.8% thought *Everest* was either “very” or “moderately” interesting. Those who were more interested in learning about the film’s topics prior to viewing found the film more interesting. Viewers liked both the entertainment quality of the film as well as the educational quality of the film. Students marveled at the realism. While some students appreciated the educational content of the film and expressed a desire for even more information, others felt that the film included too much talking and not enough action/excitement. Students generally reported interest in film topics and many voiced a feeling that the film should be longer. A few expressed difficulties with the theater’s accommodations and with a perceived loud sound level.

The feature most liked about the film were its cinematography, experiential qualities, story of the expedition, and educational value. The features least liked were a perceived shortage of action, the climbing tragedy, and limited footage of reaching the summit. For some students, the story of the climbing fatalities was disconcerting. Some students felt that the attention given to the tragedy was inconsistent with the general thrust of the film. Others were curious to learn more about the incident and about the outcome of other climbing expeditions that were occurring during filming. For 15% of the students, footage of reaching the summit was either “incomplete,” “uninteresting,” or “anti-climactic.” These students expressed the desire to have seen more about the summit assault.

What surprised students most were their emotional reaction to the film’s content (e.g., fatalities) and elements of the expedition (e.g., the difficulty of climbing to the summit, hazards of climbing, and complexity of the expedition). What most disappointed students were the outcome of the climbing accident, a feeling that the film could have been more interesting, and that the film wasn’t longer. Teachers reported that *Everest* had a powerful positive impact on their students and provided them with information and an experience that they could easily obtain in any other way. One teacher, for example, indicated that “The student reaction was really something. They encountered ideas that they had never faced before. They were surprised by what it takes to climb Everest and the hazards that you have to be prepared for.” Teachers generally expressed feelings that “It was worth the effort and expense to provide our students with this learning experience.”

Extent to Which *Everest* Achieved Its Intended Viewing Goals

Viewing the film significantly increased science knowledge, as measured by an 8-point content test. Viewers of *Everest* came away knowing more about the history of efforts to climb Mt. Everest, issues associated with climbing mountains, the mechanism of plate tectonics, the need for and process of acclimatizing, and general information about Mt.

Everest (e.g., the height, location, and weather of Mt. Everest, the availability of oxygen at different altitudes). One teacher commented, “We take our students to the museum to see an IMAX film every year and some of them are more like the movies you go to for entertainment. This film was more educational. I think they learned more from this film than others we’ve seen. It’s hard to measure all the things that they got out of seeing Everest.”

Affect of Performing School-Based Activities Prior to Viewing

Treatment group (i.e., students who performed activities and viewed *Everest*, students who viewed the film only) was not a significant factor in the appeal ratings nor a significant predictor of posttest scores. Performing the activities also did not differentially affect students’ reported interest in doing film-related activities after viewing *Everest*. Thus, exploration of film-related concepts via four student-centered activities prior to seeing the film did not impact knowledge or interests significantly beyond what the students learned from the film alone. When asked whether they connected the film to anything they had previously known or experienced none of the students mentioned the class experience with the teacher’s guide. Caution should be given to interpreting these findings, especially when considering the value of the teacher’s guide. It is recommended that further evaluation efforts be made to discern specific strengths and weaknesses of using the guide. This is especially true in the light of one teacher’s observation that “The science teachers love the Everest Teacher’s Guide. They’ve become a high commodity in our school. The teachers will continue to use them.”

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Summative Evaluation Design

A quasi-experimental pretest/posttest nonequivalent comparison group design was used with middle school students to evaluate the film and ancillary schoolroom activities. Intact school classes were assigned to one of two treatments: Viewing the film only (FILM) and viewing the film after doing related activities (ACTIVITY + FILM).

Five days prior to viewing the film, all students in the sample completed a pre-viewing questionnaire. The following day, two classes from each of three participating schools read the Introduction (Pages 1-3) and completed four predetermined activities contained in the *Everest Teacher's Guide* to examine their impact on viewer learning outcomes.

Four days following students' engagement in related activities (described later in the Procedure section of this report), all students in the sample from each of the three participating schools visited the Boston Museum of Science and viewed *Everest* in the Mugar Omni Theater. The following day, all students completed a post-viewing questionnaire. A teacher interview was conducted via telephone after receipt of completed questionnaires.

Method

Sample

Three middle schools, who were registered to view *Everest* during a one week period in April, 1998, were contacted about participating in the study. As indicated in Table 1, on the following page, the first middle school provided 104 seventh-grade students. The school district reports that 85.6% of its graduates go to college, the average per household income is \$66,373. The second middle school provided 37 seventh-grade students. Reportedly, 67.3% of the school's graduates go to college and the income of households is \$31,813, on average. The third middle school provided 84 sixth-grade students. About

65.6% of its graduates continue on to college and the average income for households in the district is \$46,946.

Table 1. Demographics of Participating Schools/Classes

City	State	Grade	N
Somers	New York	7	104
Berlin	New York	7	37
Bridgewater	Massachusetts	6	84

Paired pre and post-viewing questionnaires were obtained from a total of 225 middle school students. There were 156 students in the FILM treatment (i.e., viewed the film only) and 69 students in the ACTIVITY + FILM treatment (i.e., performed the *Everest* activities in school prior to viewing the film).

Information from demographic and background questions was used to determine whether the two treatment groups were equivalent groups. Chi-square analyses revealed that the treatment groups (FILM, ACTIVITY + FILM) did not differ significantly with respect to the classifications of gender, ethnicity, reported interest in learning about Mount Everest, and reported knowledge about Mount Everest (prior to viewing the film). The distribution of the sample on these classification variables is presented in Table 2.

Table 2. Demographic & Background Variables of Student Sample

Variable	N	Categories	Percent
Gender	225	Female	46.7%
		Male	53.3%
Ethnicity	225	White	89.3%
		Minority	10.7%
Interest in Learning about Everest	225	Very interested	21.3%
		Moderately interested	43.6%
		A little interested	25.8%
		Not at all interested	9.3%
Knowledge about Mount Everest	255	I know a lot	1.3%
		I know a moderate amount	19.6%
		I know a little	70.7%
		I know nothing	8.4%

Students were also asked to indicate their parent's/guardian's type of employment. The distribution of this variable is presented in Table 3.

Table 3. Employment of Parents/Guardians

Occupation	Somers, NY		Berlin, NY		Bridgewater, MA		Total
	Father	Mother	Father	Mother	Father	Mother	
Professional (business)	54	23	5	7	30	18	137
Professional (science)	4	1	–	–	4	2	11
Educator	4	9	3	–	4	8	28
Administrator	2	6	–	3	7	1	19
Manager	7	7	1	2	5	5	27
Technician (computer)	2	1	–	–	–	–	3
Clerical	1	16	–	4	–	1	22
Homemaker	1	11	–	–	–	2	14
Worker (skilled)	16	3	17	3	22	11	72
Worker (semiskilled)	–	5	–	3	–	2	10
Worker (unskilled)	7	2	8	2	10	7	36
Unemployed	–	1	2	1	2	6	12
No response	6	19	1	12	0	21	59

Procedure

Teachers were provided with a set of written instructions for administering questionnaires. One week prior to viewing *Everest*, each of the three participating teachers administered the pre-viewing questionnaire. All 225 students in the sample completed the questionnaire as part of their regular classroom activity. Teachers did not mention that the questionnaire was associated with *Everest* or the planned field trip to the museum. Questions on the pre-viewing questionnaire focused on demographic and background classification variables as well as pre-viewing knowledge about and interest in the film's topics.

Two teachers were each provided with 6 copies of the *Everest Teacher's Guide* and materials for performing pre-selected activities. Criterion for activity selection was based upon a correspondence with film content. The day following administration of the pre-viewing questionnaire, film-related activities were covered by these teachers, each working with one class of seventh-grade students at their respective schools. In compliance with instructions provided to the teachers, 69 students (i.e., members of the ACTIVITY + FILM treatment group) read the introduction in the teacher's guide. They also carried out four student-centered activities (See Table 4) to discern whether or not implementation of school-based activities contained in the *Everest Teacher's Guide* prior to viewing the film affects viewer learning outcomes.

Table 4. *Activities Performed*

<i>Activity Number</i>	<i>Title</i>
3	Plate Tectonics: Building Mountains
5	Global Positioning System
4	What Is Your Latitude and Longitude?
7	Can You Take It?

The following is a description of each of the four activities.

- The first activity titled, "Plate Tectonics: Building Mountains" (Pages 6 & 7 in Guide) involved an experiment using two continental plate models containing horizontal land feature to observe the results created by the force of plate tectonics.
- The second activity titled, "What Is Your Latitude and Longitude?" (Pages 8 & 9 in Guide) involved the use of a teacher-developed classroom map to learn how to use latitude and longitude to located features.
- The third activity titled, "Global Positioning System" (Pages 10 & 11 in Guide) involved the classroom map and 3 pieces of string containing, each containing one-inch markings, to learn how radio waves sent from orbiting satellites can be used by Global Positioning System (GPS) receivers to find latitude and longitude positions.
- The fourth project titled, "Can You Take It?" (Pages 14 and 15 in Guide) involved an exercise to test changes in students' pulse rate and to experience the need for more oxygen.

Both ACTIVITY + FILM treatment groups followed the same procedure. After reading the introduction contained in the teacher's guide, students visited three designated activity sites located in each of the two classrooms. Each site contained instructions and materials for performing one of the four experiment activities. The four

activities, as defined in the teacher's guide, suggest that students prepare all the materials themselves. To save time, the teachers prepared materials for the students beforehand, so that students could focus on the manipulation of the materials, rather than the making of them.

Students were divided into four groups, each proceeding to a different activity site to perform one of the experiments following instructions contained in the teacher's guide. After engaging in project activities for approximately 15 minutes, each group then rotated to a new site and performed the associated experiment. This rotation process repeated until each group performed all of the experiments.

Five days following the activities, all participating students from each of the three schools visited the Boston Museum of Science and viewed *Everest*. The day after viewing, the teachers administered the post-viewing questionnaire to all 225 students. Questions on the post-viewing questionnaire included the pre-viewing film content questions and questions to assess viewers' reactions to the film (as described below).

Questionnaires

Demographic and Background Variables. The pre-viewing questionnaire established respondents' status with respect to demographic classification variables (gender and ethnicity) and background classification variables (pre-viewing interest in and previewing knowledge of the film's topics).

Program Appeal. Post-viewing respondents chose one of five scaled statements to indicate how interesting or boring they found *Everest*. Viewers also explained what they liked and did not like about the film and why. Finally, an attempt was made to capture unintended effects by utilizing two sentence completion items: "I was surprised..." and "I was disappointed..."

Science Interests. Students rated their level of interest in four film-related topics both before and after viewing the film: (1) Learning about Mount Everest; (2) Learning how mountains develop; (3) Learning how to use latitude and longitude; and (4) Learning how to measure pulse rate.

Science Knowledge. Both the pre-viewing and post-viewing questionnaires included a knowledge test to assess understanding of the viewing goals. Six short answer questions comprised an 8-point test about the following topics covered in the 40-minute film. The questions and answers drawn from the film's content appear below.

1. What does the word "acclimatizing" refer to?
The adaptation of the human body to decreasing oxygen levels found at high altitudes. It is a slow process, in which breathing, heart rate, and blood pressure are all affected.
2. What is the height of Mount Everest?
Respondents were offered the following four options and asked to check the correct answer: (1) 32,184 ft., (2) 29,028 ft., (3) 25,432 ft., and (4) 23,057 ft. The correct answer is 29,028 ft.
3. Describe how Mount Everest and the Himalayas were created.
When two land forms collide, several things can occur. One type of reaction causes huge mountains to form. The area where two plates come together is called a convergent boundary. The Himalaya were formed when the Indo-Australian plate collided with the Eurasian plate. The dirt and rock from each plate was forced together and because of the force, crumpled up to make tall mountains.

4. Approximately how much oxygen is there at the top of Mount Everest?
Respondents were offered the four following options and asked to check the correct answer: (1) Twice as much, (2) The same amount, (3) Half as much, and (4) One-third as much. The correct answer is "One-third as much."
5. Why can't a helicopter fly to the top of Mount Everest?
As stated in the film, "A helicopter rescue at over 20,000 ft. seemed out of the question. Up here the air is so thin that the blades have almost nothing to bite into. At any moment the aircraft may lose life and fall out of the sky."
6. What does the term "plate tectonics" refer to?
A theory of global dynamics having to do with the movement of a small number of semi-rigid sections (plates) of the earth's crust, with seismic activity and volcanism occurring primarily at the margins of these sections.

After viewing the film, students responded to the following additional open-ended content inquiries:

- Describe two ideas or facts learned from the film.
- What, if anything, was learned about Mount Everest that was not known before viewing the film?
- What, if any, connections or associations were made between the film and anything previously known or experienced?

Results

Appeal of Everest

After seeing the film, students were asked to rate how interesting or boring *Everest* was (See Table 5). Nearly three-fourths of the sample rated the film as either "Very Interesting" or "Moderately Interesting" (73.8%). In contrast, only 4.5% thought the film was "Very Boring" or "Moderately Boring." Approximately 22% of the students reported the appeal of the film as being "Okay." On average, responses to *Everest* were very positive, as indicated by students rating of the film's appeal as 4.1 on a five-point Likert scale ranging from 1 (very boring) to 5 (very interesting).

Table 5. Rating of Appeal of Everest by Students

Variable	N	Categories	Percent*
Appeal	225	Very Interesting	46.2%
		Moderately Interesting	27.6%
		Okay	21.8%
		Moderately Boring	2.7%
		Very boring	1.8%

*Percentages sum to 100.1 %, as a result of rounding.

Expected frequencies for chi-square analyses were increased beyond 1 cell by combining the appeal categories of "moderately boring" and "very boring." Appeal ratings were found to be independent of school, treatment, gender, ethnicity, and prior estimated knowledge about the film's topics. However, prior interest in learning about the film's topics was significantly related to appeal ratings ($\chi^2(9) = 55.18, p = .0001$). As students' reported pre-viewing interest in the film topics increased, so did their mean appeal ratings. Table 6, on the following page, presents the mean appeal ratings for each level of interest in the film's topics.

Table 6. Mean Ratings of Appeal of Everest by Pre-viewing Interest in Film Topics where 1 = Very Boring and 5 = Very Interesting

Categories of Interest	N	Mean Appeal Ratings of Film
I am interested	225	4.1
Moderately interested		3.6
A little interested		3.4
Not interested		3.0

What Students Liked Most About Everest. After viewing the film, students were asked what they liked most about *Everest*, and why. All but 4 students responded to this question. Responses were sorted into the categories presented in Table 7 (Note that some students identified more than one aspect of the film as being “most liked.”). A little over half of the responses (53.3%) expressed liking the film’s cinematography. Nearly one-quarter of the surveyed students (23.1%) reported liking *Everest* because of its experiential qualities. The story of the expedition was very appealing to 19.6% of the sample students. Similarly, 19.1% liked the educational value of its content. Approximately 7.6% liked the graphic/animation. Another 6.7 reported liking everything about the film. About 5.3% of the sample liked the film’s inspirational qualities.

Table 7. What Students Liked Most About Everest

Cinematography	<u>N</u>
• Film of expedition members climbing Mt. Everest	53
• Film of avalanches	24
• Film of bicycle ride	18
• Film of scenery	15
• Film of flying across terrain	<u>10</u>
	120
Experiential Qualities	
• Vicarious experience of climbing Mt. Everest	43
• Relating to climbers’ perspective of expedition	<u>9</u>
	52
The Story	
• The story of the expedition and the problems encountered	44
Educational Value of Film Content	
• Information about mountain climbing and/or mountain climbers	27
• Information about how mountains are formed	13
• Facts about Mt. Everest	<u>3</u>
	43
Graphics/Animation	
• Graphics and animation used to illustrate ideas	17
Everything	
• The story of the expedition and the problems encountered	15
Inspirational Qualities	
• The courage of the climbers	8
• The knowledge/skill required to climb Mt. Everest	<u>4</u>
	12

The following sample of responses are reflective of what students reportedly liked most about *Everest* and are included in this report to guide future planning decisions:

- “You felt like you were on Mt Everest. I liked it because I could never climb Mt Everest.”
- “It showed a lot of scenery and it explained a lot of stuff I didn’t know.”
- “I liked how the mountains were formed. It was very interesting.”
- “I liked the avalanches because the snow felt like it was falling on me.”
- “I liked how they had the IMAX camera setup, with the flying in the air behind the bikes.”
- “I liked how they showed the mountains in the air, and how it feels like you’re flying, because I like looking at things high in the air.”
- “I liked the way you felt you were actually along beside them.”
- “I liked when they reached the summit because they reached their goal.”
- “I liked the film because it was very realistic. I also liked the way they talked to the people climbing and they got to say what they felt about climbing.”
- “I liked the fact that you used real people and showed the hardships that they faced.”
- “I liked how it showed the mountain because it showed all it’s features like the ice.”
- “I liked the really good visual effects because they allowed the film to be educational and fun at the same time.”
- “I liked how different people, from different countries with different religions, backgrounds and customs weaved their feelings and experiences of relief, pain, grief and joy together along with an enormous amount of energy.”
- “I liked the plot and the fact that those people had the courage to climb Everest.”
- “What I liked about the film Everest is when the girl was climbing the ladder because that looks hard and she did it.”
- “I liked the part when they reach the summit because it shows perseverance.”

What Students Liked Least. After the film, students were asked also what they liked least about *Everest*, and why. Responses indicating a disliked feature were sorted into categories presented in Table 8, on the following page. Of the 225 students in the sample, 7.8% did not respond to this question. Approximately 28% of the students liked everything about *Everest*. In contrast, about 20.4% of the responses expressed the feeling that there wasn’t enough action (e.g., more of the climbing should have been shown). Another 16.4% reported not liking coverage of the climbing tragedy. About 15.1% of the sample indicated not liking footage of reaching the summit because it was incomplete, uninteresting, or anti-climactic. Approximately 8% of sample students were displeased with the OMNI theater’s accommodations (e.g., poor view from seat location, seating discomfort). About 5.3% of the students thought there was not enough information. Another 1.3% were annoyed that the sound level was too loud. A similar percentage (1.3%) felt some aspects of the film showed action that was too dangerous to be enjoyable. About 1% felt that to much attention was given to religion.

Table 8. What Students Liked Least About Everest

Liked Everything	<u>N</u>
• Liked everything about Everest	63
Not Enough Action	
• The film should have shown more climbing/ action	46
The Climbing Tragedy	
• Coverage of the fatalities was unnecessary/ not consistent	19
• The fatalities produced discomfort	<u>16</u>
	37
Reaching the Summit	
• Footage of reaching the summit was incomplete	18
• Footage of reaching the summit was uninteresting	9
• Footage of reaching the summit was anti-climactic	<u>7</u>
	34
OMNI Theater Accommodations	
• Poor view from seat location	15
• Seating uncomfortable	<u>3</u>
	18
Not Enough Information	
• The film should have contained more information	12
Sound Level	
• Sound level was too loud	3
Climbing is Too Dangerous	
• Some aspects were too dangerous to be enjoyable	3
Too Religious	
• Too much attention given to religion	2

The following sample of responses are reflective of what students indicated they did not like about *Everest* (Included are representative positive to this item.):

- "There wasn't a part I didn't like, I liked the whole thing."
- "A lot of talking not enough action."
- "There was too little action."
- "There was not enough action or photography."
- "I didn't like how the people died. I think it was really sad. All they were trying to do is complete their dream, but it didn't happen."
- "I didn't like how you had to tell us about the father-to-be dying, it was really sad, but you still should keep it in because it shows how deadly the mountain is."
- "It didn't tell enough about the other groups climbing the mountain."
- "It was kind of boring when they were at base camp. I did not like watching all of the waiting periods."
- "When they went to the top of the mountain because all they did was put some flags up there."
- "I did not like how they put some of the film on the ceiling because I had to strain to see."
- "I liked the whole movie except that I was in the front seats and had to lean back to see."
- "It started out teaching you about the mountain and then went too much into the climbers personal life and it could be boring."

- “There were not as much facts as there could have been.”
- “The sound was too loud.”
- “I didn’t like the background music because it was too loud.”
- “I didn’t like when they showed them on the ladders, I thought they were going to fall in the crevice.”
- “The beginning was all like prayer and religious stuff.”

What Surprised Students. In order to capture unplanned appeal effects, the post-viewing sample was asked to complete the sentence, “I was surprised” Responses were sorted with keywords and the number of responses in each mutually exclusive category are presented in Table 9. Approximately 12% of the sample wrote no answer to the question. Approximately 27% of the sample were surprised by their emotional reaction to the film’s content. Another 22.7% were surprised by the elements of the expedition. About 20% were positively surprised by the quality of the film. Slightly more than 13% were surprised by the information contained in *Everest*.. About 3.6% reported being surprised by the scenic beauty of Mt. Everest. Another 1.3% of the sample indicated that they were positively surprised by the graphics and animation contained in *Everest*.

Table 9. Students’ Completion of “I was surprised”

Viewers’ Emotional Reaction	<u>N</u>
• Reaction to fatalities	42
• Reaction to climbers experience	12
• Reaction to climbers courage	<u>7</u>
	61
The Expedition	
• Footage of climbing to the summit	33
• The hazards of climbing Mt. Everest	10
• The complexity of the expedition	5
• Story associated with climbing	<u>3</u>
	51
Film Quality	
• How realistic the film was	24
• The excellent quality of the cinematography	16
• How interesting, absorbing, engaging the film was	<u>5</u>
	45
Factual Information	
• About climbing Mt. Everest	19
• About acclimatizing	5
• Use of communication equipment	2
• About avalanches	<u>4</u>
	30
Scenery	
• The scenic beauty of Mt. Everest	8
Graphics/Animation	
• Graphics and animation used to illustrate ideas	3

The following sample of responses are reflective of responses completing the sentence fragment:

I was surprised . . .

- “that a lot of people died on Everest.”
- “that so many have tried to climb Everest.”
- “that the guy lived.”
- “how long it took to climb the mountain.”
- “at how cold it could get at night”
- “at the storms.”
- “how much equipment they had.”
- “that they made it to the top”
- “that the Spanish lady made it.”
- “at how real the film seemed.”
- “at how realistic the climb was.”
- “at the high quality of the film.”
- “that it felt like you were moving.”
- “at how you actually felt like the avalanche was coming toward you.”
- “when the wind storm appeared.”
- “that they waited so long to acclimatize”
- “at how thin the air was.”
- “at how they could patch the cell phone call to Bob Halls wife.”
- “when the avalanche came down.”
- “by the size of the mountain.”
- “by how big the mountain was.”
- “to see the graphics.”
- “by the graphics.”

What Most Disappointed Students. Survey respondents also completed the sentence stem: “I was most disappointed” Responses were sorted with keywords and percentages of each mutually exclusive category are shown in Table 10, on the following page. Approximately 10.7% of the sample wrote no answer to the question. About 8.5% of the sample indicated that nothing about the film was disappointing. Nearly half of the students (45.7%) were disappointed by the consequences of the climbing tragedy. Another 9.8% reported being disappointed that the film wasn’t interesting. Other members of the sample (7.1%) felt that the film is too short. A slightly smaller percentage (5.8%) reported that they were disappointed that the film had not contained more information. About 4.8% of the students reported being disappointed with the OMNI Theater’s accommodations (e.g., seating location, poor seat comfort). A few members of the sample (3.1%) found the limited amount of climbing footage to be disappointing. About 2.2% of the sample were disappointed that the film had not made more use of the IMAX® Dome format. Another 1.3% were disappointed at feeling motion sickness. About 1% were disappointed by what was thought to be a limited use of graphics.

Table 10. Students' Completion of "I was most disappointed. . ."

Not Disappointed At All	<u>N</u>
• Nothing about the film was disappointing	19
The Climbing Tragedy	
• The fatalities produced discomfort	103
Not Interesting	
• Story not interesting	9
• Footage of reaching summit not interesting	7
• Footage not interesting generally	<u>6</u>
	22
Film Length	
• The film is too short	16
Information	
• Want more information about the climbing tragedy	6
• Want more information about mountain climbing	4
• Want more information about climbers	<u>3</u>
	13
OMNI Theater Accommodations	
• Poor view from seat location	6
• Seating uncomfortable	<u>5</u>
	11
Not Enough Climbing Footage	
• Footage of climbing to the summit	7
Limited Use of IMAX® Dome Format	
• Film did not exploit 3-dimensional capabilities of IMAX® Dome theater	5
Motion Sickness	
• Experiencing nausea due to motion on screen	3
Limited Use of Graphics	
• Not enough graphics	2

The following sample of responses are reflective of responses completing the sentence fragment:

I was disappointed . . .

- "when it ended."
- "at nothing."
- "that I didn't get to see it twice."
- "that so many people died."
- "that the father-to-be had to die."
- "when Rob Hall died and the guy lost his hands."
- "that a lot of the people in their group died and people got frostbitten."
- "when the guy had to get his hands amputated."
- "that it was more about peoples lives."
- "that they didn't have more about the top."
- "that it wasn't longer."
- "it was so short."
- "that it couldn't last longer."

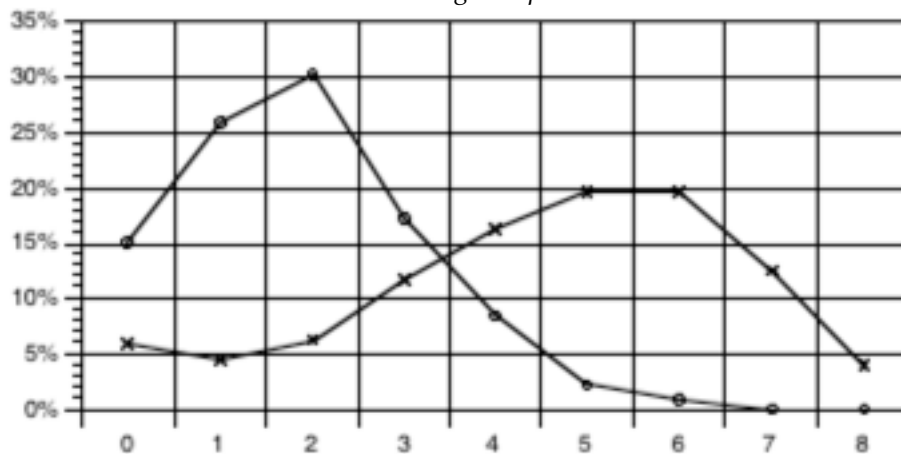
- “that they didn’t tell about how all the groups joined together.”
- “that it didn’t say enough about the other climbers.”
- “that the seats were so close.”
- “in my chair it was crooked.”
- “I think you should show more of the top of the mountain.”
- “by the top of the mountain.”
- “that they didn’t show how they got down.”
- “when it didn’t show them descend.”
- “that there weren’t more air shots.”
- “that you didn’t move more.”
- “that they didn’t “scare” us more with the realisticness.”
- “that I had to close my eyes sometimes because I was dizzy.”
- “that it made me nauseous at times.”
- “that it wasn’t very graphic.”

Impact on Knowledge

Achievement of Intended Viewing Goals. Understanding of the film’s content was assessed via an 8-point test with multiple-choice and short answer items. Figure 1, on the following page, shows the distribution of the students’ test scores for both the pre-viewing and post-viewing samples.

The post-viewing mean achievement score for the whole sample was 4.52, significantly higher than the pre-viewing mean score ($M = 1.88$), as tested by a paired t-test, $t(1,224) = 18.17, p \leq .0001$. A multiple regression analysis with posttest scores as the criterion variable and pretest scores entered as the first predictor resulted in an R^2 of 4.8 and a significant coefficient ($t = 3.36, p \leq .001$). Treatment (FILM, ACTIVITY + FILM) added as a second predictor decreased the value of the adjusted R^2 . Thus, approximately 4.8% of the variability in posttest was accounted for by its linear relationship with the pretest and the treatments did not contribute to the predictive power of the regression. Having experienced the activities in class did not impact students’ film knowledge.

Figure 1. Distribution of Test Scores for Pre- and Post-viewing Samples



Interest in Everest-Related Topics. Before and after viewing the film, students were asked to rate on a 5-point Likert scale ranging from 1 (not interested at all) to 5 (very interested) how interested they were in learning about each of the topics related to *Everest*. On average, students were moderately interested in all four activities, both before and after viewing the film (See Tables 11 and 12 on the next page). Note that higher means are associated with more interest in learning about the specified topics, and lower means are associated with less interest. Note also that the topics are arranged in descending order with the most valued topic placed at the top of each table (i.e., Learn about Mount Everest, with means of 3.4 and 3.5, respectively).

Table 11. Interest in Topics Prior to Viewing Everest*

	N	Mean	1	2	3	4	5
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Learn about Mount Everest	225	3.4	15 (7%)	39 (17%)	68 (30%)	59 (26%)	44 (20%)
Learn how mountains develop	225	3.0	26 (12%)	62 (28%)	59 (26%)	51 (23%)	27 (12%)
Learn how to measure my pulse rate	224	2.8	68 (30%)	66 (29%)	51 (23%)	22 (10%)	16 (7%)
Learn how to use latitude & longitude	223	2.3	54 (24%)	48 (21%)	57 (25%)	29 (13%)	36 (16%)

*Totals may not equal exactly 100.0% due to rounding.

Table 12. Interest in Topics After Viewing Everest *

	N	Mean	1	2	3	4	5
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Learn about Mount Everest	224	3.5	21 (9%)	27 (12%)	58 (26%)	61 (27%)	57 (25%)
Learn how mountains develop	224	2.7	48 (21%)	64 (28%)	47 (21%)	36 (16%)	29 (13%)
Learn how to use latitude & longitude	223	2.5	72 (32%)	52 (23%)	41 (18%)	32 (14%)	26 (12%)
Learn how to measure my pulse rate	223	2.1	93 (41%)	59 (26%)	38 (17%)	21 (9%)	12 (5%)

*Totals may not equal exactly 100.0% due to rounding.

ANOVAs with repeated measures were applied to the pre/post mean interest ratings for each activity with Treatment as a factor. Treatment was not significant in any of the four analyses. Consequently, seeing the film with or without doing pre-viewing classroom activities had no significant impact on students' interest in the four specified topics.

General Ideas or Facts Learned.. Students were asked on the posttest questionnaire to describe two ideas or facts that they learned from the viewing *Everest*. Of the 225 students in the sample, 197 (77.3%) provided two ideas or facts, 17 (6.7%) provided one idea or fact, and 11 (4.3%) students did not answer at all. The ideas/facts provided were sorted with keywords, and percentages of each mutually exclusive category and sub-category are shown in Table 13, on the following page. The percentages were calculated based on the possibility of receiving 450 responses to this question (i.e., two facts per student).

Table 13. General Ideas and Facts Students Reported Learning From Everest

General Information About Mt. Everest	N
• Mt. Everest is 29, 028 ft.	52
• Weather can be very sever on Mt. Everest	40
• There is 1/3 less oxygen at the summit of Mt. Everest than at sea level	18
• Mt. Everest is located in the Himalayas	16
• Mt. Everest is the highest mountain on Earth	12
• There are different climactic zones on Mt. Everest	<u>6</u>
	144
Information about the expedition	
• Mountain climbing involves many dangers, beside avalanches (e.g., frostbite)	32
• Climbers need to bring oxygen when climbing summit of Mt. Everest	17
• Climbing Mt. Everest requires courage	17
• Avalanches are a danger on Mt. Everest	16
• There have been a large number of fatalities on Mt. Everest	11
• Several camps were used in the expedition	11
• Climbing Mt. Everest requires a high level of skill	10
• Biographic information about past and current climbers of Mt. Everest	6
• Moving across ice fields on Everest requires the use of ladders	6
• It takes a long time to climb Mt. Everest	4
• It's possible to climb summit of Mt. Everest without bringing oxygen	4
• Flags are placed at a memorial on the summit of Mt. Everest	4
• There are very few days each year that are suitable for climbing Mt. Everest	3
• A GPS (Global Positioning System) device is used by mountain climbers	<u>2</u>
	143
Information associated with "plate tectonics"	
• The force of colliding land masses pushes them upward to form mountains	32
• Constantly moving plates collide into each other	14
• The Height of Mt. Everest increase by about 1/4 inch per year	<u>10</u>
	56
Information associated with "acclimatizing"	
• Climbers must ascend slowly to allow body to adjust to change in altitude	24
• There is less oxygen available to climbers as altitude increases	10
• Number of blood cells increases with increase in altitude	8
• Altitude sickness can result from oxygen depletion	<u>4</u>
	46
Why a helicopter can't fly to the top of Mt. Everest	
• The air is too thin for the blades to lift a helicopter to the top of Mt. Everest	17
Information About Buddhism	
• Ceremonial Buddhist practices	5

Approximately 46.2% of the sample learned general information about Mt. Everest. About 63.5% reported learning information about the expedition and it's climbers. Another 42.6% of the sample said that they learned information about plate tectonics. About 20.4% indicated that they learned information associated with acclimatizing. Other members of the sample (7.6%) learned why a standard helicopter can't fly to the top of Mt. Everest. A few students (2.2%) learned about Buddhism.

Information Learned About Mt. Everest. We were interested to learn from our sampled students if they learned anything specifically about Mt. Everest that they didn't know prior to viewing the film. Of the 225 sample students, 144 (64%) felt they had learned something new. However, about 23.1% of the students identified topics related to climbing Mt. Everest and Buddhism as information they learned rather than specific information about Mt. Everest as requested. Additionally, six students did not

respond to this item. Of those who said that they had learned something new, 138 went on to describe what they had learned. All responses to this item were sorted with keywords, and percentages of each mutually exclusive category are shown in Table 14.

With respect to information learned regarding Mt. Everest, note that approximately 28.4% of the sample learned general information about Mt. Everest. Another 9.3% of the sample said that they learned information about plate tectonics, relative to the development of Mt. Everest.

Table 14. *Specific Information learned About Mt. Everest*

General Information About Mt. Everest	N
• Mt. Everest is 29, 028 ft.	17
• Weather can be very sever on Mt. Everest	14
• Mt. Everest is located in the Himalayas	13
• Mt. Everest is the highest mountain on Earth	8
• There is 1/3 less oxygen at the summit of Mt. Everest than at sea level	7
• There are different climactic zones on Mt. Everest	5
	64
Information about the expedition	
• Climbers have died from sever weather on Mt. Everest	11
• Avalanches are a danger on Mt. Everest	9
• Climbing Mt. Everest requires special equipment	6
• Biographic information about expedition climbers	5
• Climbing Mt. Everest requires courage	2
• Several camps were used in the expedition	2
• Climbing Mt. Everest requires a high level of skill	2
• It takes a long time to climb Mt. Everest	2
• Climbers must train to climb Mt. Everest	1
• It's possible to climb summit of Mt. Everest without bringing oxygen	1
	41
Information associated with "plate tectonics"	
• The force colliding land masses pushes them upward to form mountains	17
• The Height of Mt. Everest increase by about 1/4 inch per year	4
	21
Information associated with "acclimatizing"	
• Climbers must ascend slowly to allow body to adjust to change in altitude	13
• There is less oxygen available to climbers as altitude increases	4
	17
Information About Buddhism	
• Ceremonial Buddhist practices	1

The following sample of responses are reflective of what students indicated they learned about Mt. Everest:

- "All I knew about Mt. Everest is where it was, how tall it was and it was the tallest in the world. Everything else mentioned in the movie I learned."
- "The air is too thin for a helicopter to fly to the top."
- "I learned the height and most of all interesting characteristics of the mountain."
- "The number of storms taking up most of the year except like one week in May."
- "I never knew it could be -100 degrees on Mt. Everest."
- "Many of the things that the people used to climb Mt. Everest I did not know about. I also did not know about the base camp and the other camps along the way to the top of Mt. Everest."

- “How much it grows per year.”
- “I did not know much about Mt. Everest, so this film gave me a summary of what the mountains are like.”
- “That it is part of the Himalayas.”
- “How thin the air was and everything else.”

Personal Associations or Connections With the Film. After viewing the film, students were asked if they associated or connected the film with anything they previously knew or experienced. Of the 225 students in the sample, 43 responded positively. While 35 of these respondents described the association/connection, 2 did not. The 35 responses were sorted by keyword into mutually exclusive categories, which are presented in Table 15.

Although 30.7% of the sample performed activities contained in the *Everest Teacher’s Guide* the week prior to seeing the film, none of these students connected the activities with the film. Small groups of the sample associated the film with their prior experience with outdoor sports (5.8%), another film/TV program (4.0%), and another mountain (3.1%). A few students (1.3%) associated the film with a prior personal experience. Additionally, 2 students indicated that they associated the film with a short story they had read and 1 student was reminded of an avalanche incident.

Table 15. Students’ Associations or Connections Everest

Outdoor Sports	N
• Hiking	5
• Snowboarding	3
• Mountain climbing	2
• Whitewater rafting	2
• Mountain biking	<u>1</u>
	13
Another Film/TV Program	
• Previous IMAX format films	4
• Special on Television about Mt. Everest	3
• The movie “Alaska”	1
• Movie about a volcano	<u>1</u>
	9
Another Mountain	
• The Catskill Mountains	3
• K2	2
• Rocky Mountains	1
• Mountain in Hawaii	<u>1</u>
	7
Personal Experience	
• A snowstorm	2
• A ride at Bush Gardens	<u>1</u>
	3
Something Read	
• A short story about a man freezing	2
Other Mountain Climbing Accidents	
• A man hurt in an avalanche in Aspen, Colorado	1

The following sample of responses are reflective of associations or connections students made with *Everest*:

- “The feeling of being completely exhausted, but having to go on and pushed on has been experienced by me and it was very touching to hear the other people explain such a powerful feeling.”
- “I’ve tried climbing fake rocks with all the rocks sticking out to pull yourself up with the harnesses.”
- “My grandpa lives in Hawaii and I’ve seen a 11/2 mile high mountain.”
- “When I went snowboarding.”
- “A man was caught and killed in an Aspen avalanche.”
- “When I went mountain biking.”
- “Whitewater rafting.”
- “The last IMAX I saw.”
- “Another IMAX show.”
- “When I went hiking up a mountain.”
- “The movie Alaska.”

Teacher Interview

The following feedback was provide by a teacher during a telephone interview:

- “It’s such a powerful film that I believe it has a significant impact on children.”
- “What kids see on television or in movies makes things look easy to do. Everything looks romantic, even when it looks tough. This film wasn’t like that. It was powerful in that it showed that meeting a challenge can require knowledge and skill.”
- “The kids saw in the film the kind of effort it requires to take on something that’s really hard to accomplish. That’s an idea that they had not really considered before. They had no background experience that enabled them to understand what it takes to succeed at something that’s really hard.”
- “We have enrichment programs in school, but we don’t always challenge everybody. It’s important for kids to realize that some tasks require expertise. They need to see that there are consequences to what you do. People really can get hurt or loose their lives mountain climbing. The film showed them that there’s another side to the stories they normally see in movies.”
- “The science teachers love the Everest Teacher’s Guide. They’ve become a high commodity in our school. The teachers will continue to use them.”
- “We take our students to the museum to see an IMAX film every year and some of them are more like the movies you go to for entertainment. This film was more educational. I think they learned more from this film than others we’ve seen. It’s hard to measure all the things that they got out of seeing Everest.”
- “The student reaction was really something. They encountered ideas that they had never faced before. They were surprised by what it takes to climb Everest and the hazards that you have to be prepared for.”
- “The faculty thought Everest was incredible. It was worth the effort and expense to provide our students with this learning experience.”

Discussion

- *To what extent did Everest appeal to student viewers?*

Of the 225 student viewers, 73.8% thought *Everest* was either “very” or “moderately” interesting. Those who were more interested in learning about the film’s topics prior to viewing found the film more interesting. Viewers liked both the entertainment quality of the film as well as the educational quality of the film. Students marveled at the realism. While some students appreciated the educational content of the film and expressed a desire for even more information, others felt that the film included too much talking and not enough action/excitement. Students generally reported interest in film topics and many voiced a feeling that the film should be longer. A few expressed difficulties with the theater’s accommodations and with a perceived loud sound level.

The feature most liked about the film were its cinematography, experiential qualities, story of the expedition, and educational value. The features least liked were a perceived shortage of action, the climbing tragedy, and limited footage of reaching the summit. For some students, the story of the climbing fatalities was disconcerting. Some students felt that the attention given to the tragedy was inconsistent with the general thrust of the film. Others were curious to learn more about the incident and about the outcome of other climbing expeditions that were occurring during filming. For 15% of the students, footage of reaching the summit was either “incomplete,” “uninteresting,” or “anti-climactic.” These students expressed the desire to have seen more about the summit assault.

What surprised students most were their emotional reaction to the film’s content (e.g., fatalities) and elements of the expedition (e.g., the difficulty of climbing to the summit, hazards of climbing, and complexity of the expedition). What most disappointed students were the outcome of the climbing accident, a feeling that the film could have been more interesting, and that the film wasn’t longer. Teachers reported that *Everest* had a powerful positive impact on their students and provided them with information and an experience that they could easily obtain in any other way. One teacher, for example, indicated that “The student reaction was really something. They encountered ideas that they had never faced before. They were surprised by what it takes to climb Everest and the hazards that you have to be prepared for.” Teachers generally expressed feelings that “It was worth the effort and expense to provide our students with this learning experience.”

- *To what extent did Everest achieve its intended viewing goals?*

Viewing the film significantly increased science knowledge, as measured by an 8-point content test. Viewers of *Everest* came away knowing more about the history of efforts to climb Mt. Everest, issues associated with climbing mountains, the mechanism of plate tectonics, the need for and process of acclimatizing, and general information about Mt. Everest (e.g., the height, location, and weather of Mt. Everest, the availability of oxygen at different altitudes). One teacher commented, “We take our students to the museum to see an IMAX film every year and some of them are more like the movies you go to for entertainment. This film was more educational. I think they learned more from this film than others we’ve seen. It’s hard to measure all the things that they got out of seeing Everest.”

- *Did the implementation of school-based activities prior to viewing affect outcomes?*

Treatment group (FILM, ACTIVITY + FILM) was not a significant factor in the appeal ratings nor a significant predictor of posttest scores. Performing the activities also did not differentially affect students' reported interest in doing film-related activities after viewing the film. Thus, exploration of film-related concepts via four student-centered activities prior to seeing the film did not impact knowledge or interests significantly beyond what the students learned from the film alone. When asked whether they connected the film to anything they had previously known or experienced none of the students mentioned the class experience with the teacher's guide. Caution should be given to interpreting these findings, especially when considering the value of the teacher's guide. It is recommended that further evaluation efforts be made to discern specific strengths and weaknesses of using the guide. This is especially true in the light of one teacher's observation that "The science teachers love the Everest Teacher's Guide. They've become a high commodity in our school. The teachers will continue to use them."

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