

Phase I Final Report
Grant #1 R43 CA103623
Computer-Assisted Tobacco Prevention for Adolescents (Tobacco World)
Project Period: 08/06/2003 – 04/30/2004
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Development of Prototype Tobacco Prevention Program

The Phase I task was the production and evaluation of a prototype interactive tobacco prevention program for middle school students. This prototype program, titled *Tobacco World*, made use of computer-based technologies to deliver content designed to prevent tobacco use initiation among adolescents. Combining video, graphics, and text, the program provided resources that address the health risks of using tobacco, the targeting of teens by tobacco companies, the hazards of environmental tobacco smoke, and the negative social implications of becoming a regular tobacco user.

Previous research and media projects by the principals in this proposal, which focused on tobacco prevention and cessation interventions for adolescents, provided the foundation for the content and organization of *Tobacco World*. The challenge was to build on our experience in creating engaging computer-based tobacco prevention and cessation programs to focus specifically on middle school age students who had not yet experimented with, or begun to regularly use tobacco. We conducted an exhaustive review of existing print and computer-based tobacco prevention media in order to assess the level of diversity and sophistication of currently available materials. We also examined current gaming and electronic education literature to determine how extensively and at what level of complexity these two concepts have been combined. The results of our research provided us with valuable information on developing an age appropriate, appealing, and unique program with an overarching theme of tobacco use prevention.

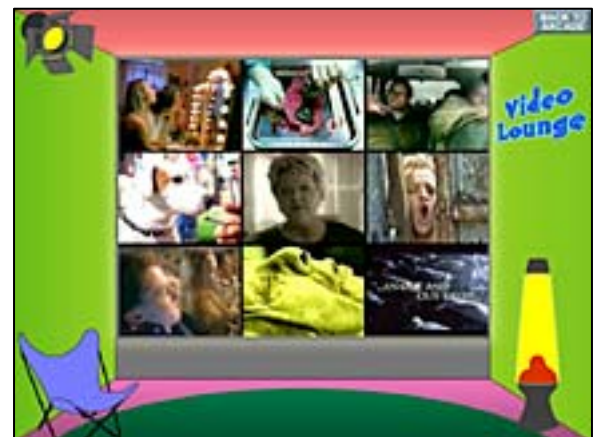
The program was created and refined based on the current guidelines established by the U.S. Department of Health and Human Services (CDC, 1999) and then modified for the target group of middle school students. During an extensive design phase, the *Tobacco World* development team assembled scripts, storyboards, and flowcharts to create a game-like atmosphere that would appeal to adolescents, while educating them about the hazards of tobacco. After exploring several different visual metaphors for the *Tobacco World* graphical user interface, we chose a video arcade “look and feel” that encouraged the user to click on game icons to explore each of the five games offered. The student user had random access navigational options and could enter or leave a game at any time. Many design decisions were based on our extensive knowledge of the wide variation in both students’ computer skills, and their familiarity with tobacco issues.

The content elements, buttons and backgrounds, video, animation, audio assets, and “wiring” of all these elements, were created with Macromedia Director™ and its Lingo™ programming language. This software allows for integration of graphics and animation and the provision of gaming functionality.



The *Tobacco World* program offered an engaging opening with a “splash” screen, incorporating a carnival “barker” voice, enticing the students to try some of the games. The user had the option of selecting one of the five main areas of the program: Video Lounge, Photo Truth, House of Horrors, Shoot Down the Lies, and Virtual Reality Cigarette Fly-Thru.

When students entered the Video Lounge they were presented with



a video wall comprised of nine screens. The opening images, selected from hundreds of anti-tobacco public service announcements (PSAs) provided by the Centers for Disease Control Media Resource Center, were chosen for their strong anti-tobacco content and potential to attract and hold the

attention of the target audience. Additionally, we selected PSAs that covered a range of tobacco topics such as environmental tobacco smoke, social norms and peer pressure, smokeless tobacco, tobacco industry's marketing to kids, and the health effects of initiating tobacco use. After viewing each video, students were able to rate them with one to five stars.



Photo Truth allowed the user to select one of four images of young teens and take a picture. This generated a strip of four photos: the original picture of the teen, the teen as a tobacco user, the appearance of negative effects (e.g. wrinkled skin, yellow teeth, fewer friends, etc.), and finally the damage that resulted from the teen's use of tobacco. These images were accompanied by rollover descriptions of how the student first began using, the first signs of problems, followed by the long-term effects of their using tobacco.

When entering the House of Horrors, the subject was shown a dark screen with creepy sounds in the background. Upon exploring the screen with the mouse, eyes appeared when rolled over. When clicked, a short video played describing the ravaging effects on the body that tobacco can cause. The horror stories illustrated: a smoker's death from lung cancer; the danger that tobacco use poses to the fetus of a pregnant woman; premature skin wrinkling and aging associated with tobacco use; a comparison between students in the pages of a school yearbook with the 1200 daily deaths from tobacco related diseases; a lung destroyed by chronic tobacco use; and the detrimental effects of tobacco on the cardiovascular system.



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chronic tobacco use; and the detrimental effects of tobacco on the cardiovascular system.

Shoot Down the Lies was a shooting gallery game that opened with the 1994 video of tobacco executives in congressional hearings, testifying that "nicotine is not addictive". A narrator states that the tobacco companies target teens and mislead them about the dangers of using tobacco. When the game started, silhouettes of testifying executives moved across the screen. The subject used a "slime" cannon to damage the executives and reveal the truth behind the false statement that appears beneath their silhouette.

Virtual Reality Cigarette Fly Thru took the user on a virtual reality tour inside a cigarette to view all of the chemicals contained in tobacco, as well as other applications for these chemicals. For example, formaldehyde was noted for its function as embalming fluid and was paired with the image of a frog pickled in a jar. The chemicals highlighted during Cigarette Fly Thru were: nicotine, formaldehyde, arsenic, carbon monoxide, Polonium 210, and ammonia.



Virtual Reality Cigarette Fly Thru took the

While these activities were not designed to target specific mediating programs, as noted on page 43, their focus is on changing social images and knowledge of physical consequences. Modifications of these games will be evaluated to assure that they do target these mediating mechanisms.

Evaluation of Phase I Prototype

Evaluation

The evaluation of the Phase I prototype program *Tobacco World* was conducted in two phases: Pilot Test, and Middle School Student Evaluation.

1. *Pilot Test.* Nine middle school students were recruited from the Eugene/Springfield, Oregon area to test the program with minimal instruction. Pilot subjects used the *Tobacco World* program at our offices, and each student provided an affirmative parental consent to participate. Test subjects provided valuable information on the program's strong points, as well as those areas that needed further development. Students were observed while using the program to allow us to identify any problems with navigation or instructions. In order to solicit information on changes in format or content, each student was interviewed directly after using the program. They were also queried about overall satisfaction with the program. Students were paid \$20 for the trial testing, and they averaged about 60 minutes for completion of all tasks.

2. *Middle School Student Evaluation.* Having previously established a relationship with Lincoln Middle School, located in the small community of Cottage Grove near Eugene, Oregon, we were able to enlist the assistance of a teacher to recruit 136 students in 6th, 7th and 8th grades to try the program. We were also able to enlist the support of Parkrose Middle School in the Portland metro area. Our contact in this school recruited 63 6th, 7th and 8th graders to try the program. This gave us a good test of *Tobacco World* both in rural and urban settings. We took two Apple eMac computers to each school and set them up in the classrooms. Approximately 56% of the entire sample were 8th graders, 34% were 7th graders and 10% were in the 6th grade. Fifty-six percent of the sample was male, and 44% was female (see Table 1). Seventy-six percent of the sample was Caucasian, with 7% American Indian, 4% African American, and 3% Asian. The remaining students did not respond to this question or responded that they were of another race (5%). Nine percent indicated that they were of Hispanic ethnicity.

Table 1: Grade Level and Gender*

	6 th Grade	7 th Grade	8 th Grade
Male 55.6%(N=105)	8.5% (N=9)	30.5% (N=32)	61% (N=64)
Female 44.4%(N=83)	11.9% (N=10)	35.7% (N=30)	51.2% (N=43)

*Eleven students did not indicate gender or grade level.

Before exploring the program in the classroom on the Macintosh computers we provided, the students who were recruited to test the prototype program filled out a tobacco use survey. The survey asked about previous experience with cigarettes and smokeless tobacco, perception of harm from tobacco use, social images or prototypes of smokers, willingness and intentions to use tobacco as a teenager and adult, subjective norms (current tobacco use among their five best friends and friends at school), and current use among parents and siblings. For purposes of data collection, the computer generated a consecutive four-digit number with each login that the student wrote on their questionnaire. This allowed them to anonymously complete the tobacco use and consumer satisfaction questionnaires. The number was stored in a log file on the computer's hard drive, which enabled us to track the time spent in each area of the program and relate the tracking data to their evaluation questionnaires.

Twenty-two percent of the middle school sample reported that they had tried smoking, 8% had smoked in the last 30 days, 3% had tried smokeless tobacco in the last 30 days, and 17% indicated that they thought they might, or would definitely, use tobacco as a teenager. Furthermore, 49% noted that they had a parent who used tobacco. These items, which are predictors of future intentions and willingness to use tobacco, show that the sample was at risk for future use. On average, these students were moderately willing to try tobacco if offered (range = 3 to 15, mean = 8.27, s.d. = 2.75), but did not ascribe positive social images to smokers (range = 3 to 15, mean = 5.22, s.d. = 2.73).

After completing the program, the students again rated their intent to smoke and use smokeless tobacco in the future and completed a consumer satisfaction survey. Individual items for the satisfaction survey are listed below. Ratings were made using a 5-point Likert scale. Almost all of the participants rated the program favorably on all items (gave a rating between 1 and 3 on the Likert Scale). They rated highly the usefulness of the program, the ease of use, and their overall satisfaction with the program (Table 2). See Appendix D for a sample copy of the intention and use survey and the consumer satisfaction survey. All data and computer

tracking of program use were anonymous, and names of students were not known to the researchers. No parental consent was required, as this was completed in schools as part of the health education curriculum.

Table 2: Tobacco World Evaluation.

Program Evaluation (N = 199)	Five-Point Likert Scale	Mean (S.D.)
How interesting did you find the <i>Tobacco World</i> program?	1 = very interesting	2.35 (1.77)
How complete was the program in providing information about tobacco?	1 = very complete	1.91 (1.120)
How much new information about tobacco did the <i>Tobacco World</i> program provide?*	1 = a lot of new information	2.44 (1.154)
This program will make it LESS LIKELY that kids will become tobacco users.**	1 = very much agree	2.12 (1.084)
How much did you like the music, sound effects, and voices in the program?	1 = liked a lot	2.73 (1.132)
How easy was the program to use?	1 = very easy	1.56 (.985)
How strongly would you recommend the program to friends who want to learn about or quit smoking?*	1 = very strongly	2.23 (1.134)
Overall, how would you rate the <i>Tobacco World</i> program?	1 = excellent	2.33 (1.053)

**combined items for measure of effectiveness

We combined three items from this survey to obtain a measure of kids' perceptions of the effectiveness of the program. These items included whether the program provided new information, if it would make it less likely that kids will become tobacco users, and whether they would recommend the program to other kids (items with asterisks were included in this measure). The scale comprised of these three items had an alpha of .67.

The change in intentions to smoke from pre to post prevention program was marginal (Pre: Mean = 9.02; Post: Mean = 9.20 (a higher score is indicative of less intent), $t(171) = -1.61$, $p = .11$) and the effect size associated with this change was small ($d = .12$). Change in intentions to smoke was related to perception of effectiveness of the program ($r = -.15$), suggesting that the greater perception of effectiveness, the greater the change in intention. Controlling for perception of effectiveness, change in intentions was significant ($F(1, 170) = 6.57$, $p < .05$). There was no pre-post change in intentions to use smokeless tobacco in the future and the effect size was small ($d = .04$). However the relatively large proportion of teens expressed no intention to smoke (70%) or chew tobacco (92%) when older, limited the effect size related to change in intention (i.e., a ceiling effect). An analysis of change in intentions using data from only those who expressed some intention at the pre-test showed a significant decrease in intentions for both cigarettes ($t(51) = 3.001$, $p < .01$; Pre: Mean = 6.77; Post: Mean = 7.67, on a 10 point scale; $d = .46$) and chewing tobacco ($t(13) = 2.245$, $p < .05$; Pre: Mean = 2.54; Post Mean = 3.31; $d = .62$) on a 5-point scale, with a higher score indicating less intent).

Discussion of Evaluation Results

The results of the Phase I *Tobacco World* evaluation provide strong support for students' willingness to receive tobacco information when presented in an interesting and engaging fashion, and that this information was related to change in their intention to smoke in the future, after controlling for perception of effectiveness. It was gratifying that the program significantly decreased intention, among those who expressed intention at baseline, producing moderate to large effect sizes.

The consumer satisfaction items further attest to the perceived value of the program (see Table 1). Students were very positive in their evaluation, giving the program an overall high rating, and indicating that they would recommend the program to others. Students found the program easy to use, and reported that they learned new information. These results are very encouraging, demonstrating students' receptivity to tobacco prevention information presented in an engaging game-like format. The teachers to whom we have shown the *Tobacco World* prototype program have been very enthusiastic in their support. Their responses have been the most positive that we have ever received from educators for any adolescent program we have developed.