

InfoLink Program Theory
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August 7, 2000

Overview and Purpose

This document is intended to present a consensus vision of InfoLink's "program theory." Program theory is a summary of the outcomes a program is intended to achieve and, just as importantly, the strategies and interventions it uses to get there. In other words, program theory is a statement of how a program is supposed to work. Program theory documents such as this one can have multiple purposes:

- Guiding program implementation (serving as a reference point to make sure the program is staying focused on its core goals and strategies);
- Highlighting key decision points (identifying divergence among program leadership as to how the program operates and serving as a basis for resolution of those differences);
- Structuring evaluation (determining how and to what extent core strategies are being implemented and core goals being reached); and
- Communicating to external audiences how the program works (particularly to those who may be interested in replicating the program or to potential funders).

This program theory statement was developed through examination of program materials (primarily those posted on the website) and discussion with key program stakeholders.¹ Program theory is always a work in progress as a program learns and evolves, and the evaluation team hopes this statement will be a basis for ongoing discussion. In the meantime it will be used to guide our evaluation work, from the development of questions and instruments through data analysis and report writing.

Summary Statement

InfoLink is an intensive summer program that is intended to provide low income high school students with information technology and professional development skills, experience and confidence to improve their long-term educational and occupational attainment.

This brief summary statement encapsulates the program's strategies and assumptions in four key areas:

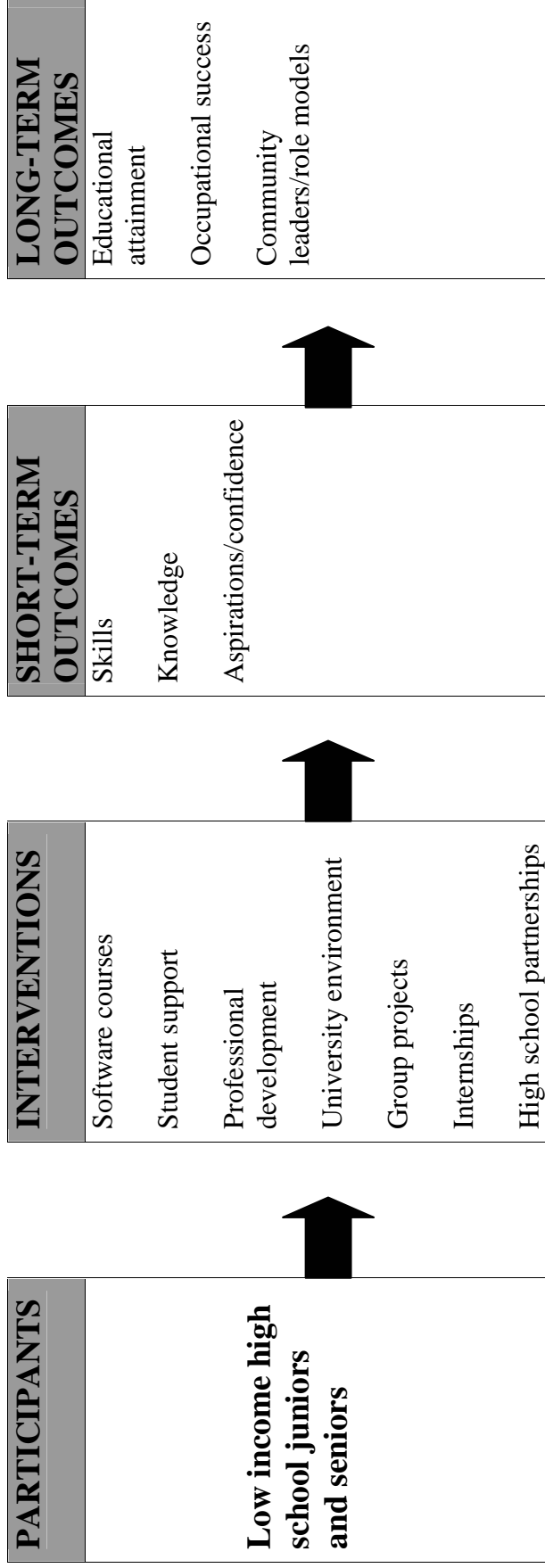
- (1) Program participants
- (2) Interventions
- (3) Short-term outcomes
- (4) Long-term outcomes

These four components are presented in the attached program theory diagram and then examined in more detail in the following sections.²

¹ Stakeholders formally interviewed about program theory and implementation were Tom Cullen, Kristin Kurland, Wilpen Gorr, Gary Franko, Akhilesh Bajaj, and George Tita. Mark Kamlet provided perspectives on how the program works during a conversation on evaluation design.

² Sections 1 and 2 on the program's participants and interventions attempt to capture not only the "theory" of how the program works but the program's actual experience with each of these components over six years of implementation. Because these sections present descriptive information about how the program has actually operated, they are longer and more detailed than sections 3 and 4 which deal with goals.

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(1) Program participants

InfoLink's participants are low-income urban high school juniors and seniors.³ Historically participants have been overwhelmingly minority, specifically African-American. To qualify, students must meet federal guidelines for free or reduced price lunch, a common indicator of poverty. Program leaders describe most participants as having "little sense of direction of their lives" and some as being "seriously at risk for dropping out, crime, and other problems." Clearly, these are students on the wrong side of the digital divide, having little experience with or even basic awareness of the kinds of information technologies critical to successful participation in the new economy.

The program emphasizes in its materials and recruiting process that the only criteria for acceptance other than low-income status is an interest in technology, not past experience. Stakeholders report that when the program began six years ago technology was still not prevalent at disadvantaged high schools, and many students came in with little or no technology exposure. Now they find that the students are coming in already familiar with the basics of word processing and the Internet and "with their appetites already whetted, more excited about why they need technology and why it is going to be useful in their lives."

InfoLink's high school partnerships are a crucial aspect of participant selection and support. Rather than accepting students from the region at large, the program works over the course of several years in targeted partnerships with two disadvantaged high schools at a time. This allows for a cohort from each participating school to move through the program together, a mechanism that stakeholders believe is an important support for students going through such a rigorous program. The school partnership model also builds awareness of and interest in the program in participating sites.

There is some disagreement among program stakeholders as to whether InfoLink is an "elite" model that targets the "cream of the crop" at their (generally disadvantaged) high schools. One stakeholder described it as a "purposefully elitist program- it won't mainstream well. It would really only work for kids with certain characteristics." Two others, however, emphatically disagreed, arguing that "InfoLink would work well for any student." One went on to elaborate that "the top students already have the confidence and self-esteem that we are trying to instill. We want the students that this is going to make the difference for, really turn their lives around." Still another stakeholder took a middle ground on the question of whether InfoLink is an elite program, specifying that "We take from the top of the bottom. We take kids that are talented but unfocused and give them an interest and a target. But they have to come in with some underlying motivation, being committed and eager to learn."

³ Stakeholders described the parts played by a number of other participants in the InfoLink network besides high school students, including Carnegie Mellon University and individual faculty members, partner high schools and the teaching fellows from them, the regional high tech business community, community organizations, and the students' own families/parents. It was clear, however, that the program's core goals are for high school students and that other participants are instrumental rather than primary. This document will concentrate on the program's high school student participants and how the program is intended to work for them.

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As this last comment suggests, it is clear that the students InfoLink selects do have some characteristics that are vital to how the program operates. While it would be overstating the case to call these students the elite even of their disadvantaged high schools, the fact that they are willing to commit to such a demanding program suggests that they bring a great deal of motivation and commitment to the table. Perhaps it would be accurate to say that they are not so much the brightest but certainly among the most driven of their peer group.

InfoLink's recruiting model recognizes the importance of selecting students for their motivation. Teachers at the high school partner sites who serve as fellows play a role in recruiting by identifying and encouraging students they think could benefit from the program and fulfill the commitment it requires. The most important aspect of the recruiting process, however, is what one stakeholder described as "self-selection through rigorous expectations," making it very clear how much time and effort will be required of students and then letting them decide whether they are willing to make the investment. Despite this straightforward communication of how much is expected, high rates of student attrition suggest the need for improvements in the recruiting process. One stakeholder suggested that the program would benefit from a more rigorous recruiting process, specifically the addition of student interviews that would "pick up on things like desire and motivation that may not come through on paper."

InfoLink's recruiting process must strike a delicate balance in order to select students who both (a) are truly at-risk students for whom the program will make a significant difference in life chances and (b) have the motivation, commitment, and/or family/community support to make it through the program. While always being frank about how much is expected, the program is committed to reaching out to students who might not be the most obvious choice for such a program but have untapped assets.

The question of what kinds of students InfoLink works well with is a crucial one for evaluation, because it gets at the program's replicability and expansion potential. Would this model work for any student? How deep into the pool of low income students could the program go and still work? What characteristics do the students themselves bring to the program that are important to how the model functions? As the evaluation proceeds to develop and test the program theory model that is sketched herein, these will be vital questions to explore.

(2) Interventions

InfoLink's primary intervention with participants is an intensive summer program. As suggested by the program theory diagram, this intervention is multifaceted, consisting of more than just skills training. Stakeholders articulated clearly that technology skills are necessary but far from sufficient to achieve the program's goals. To achieve the kinds of broad, long-term goals this program targets, skills must be reinforced by experiences that build knowledge and confidence. Thus although the software courses that students take are a core building block of the program and are described here first, a central premise of the program theory is that skills do not stand alone.

Software courses: InfoLink's software curriculum was developed and is regularly updated based on the kinds of technologies that are in demand in the local high tech economy. One result of

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this is that students are exposed to the kinds of “professional applications” such as GIS and CAD software that are not ordinarily available at high schools. Like many aspects of InfoLink, the design of the curriculum serves a dual purpose: not only does it build in students highly marketable skills, it simultaneously “opens up possibilities” for them by building knowledge of previously unheard of career paths.

Another crucial aspect of InfoLink’s curriculum design is that it follows a “model of professional training” based on the Masters level programs at Carnegie Mellon’s Heinz School of Public Policy and Management. According to stakeholders, the professional training model differs from traditional academic programs (at both the high school and college levels) in a number of ways:

- explicit focus on employment prospects and marketable skills;
- using the most advanced tools in the field;
- emphasis on practice and application over theory;
- heavy use of student projects, presentations, and other hands-on learning experiences; and
- treating students like professionals (respecting their ideas in collaborative, self-directed work, inculcating a sense of playfulness, experimentation, and willingness to learn from mistakes that is key to lifelong learning).

InfoLink supports this model by “expending tremendous resources on teaching that is individualized and responsive.” With a high ratio of adults in the classroom, the program can provide a great deal of hands-on learning and immediate feedback to students. A stakeholder describes the model as “expensive but effective- we could never cram so much in with just an instructor standing up front lecturing.”

A quick glance at InfoLink’s summer schedule makes it obvious how ambitious the curriculum is: 9 different kinds of software plus browsers and HTML and Java programming, many of them highly technical and completely unfamiliar to students, covered in 10 weeks. The ambitious scope raises the important question of to what extent the program aims at building specific skills in students versus simply exposing them to a wide variety of applications. On the one hand, stakeholders emphasize that “we base the courses on real university courses so these are real skills, not just exposure.” On the other hand, each instructor is teaching in one (albeit intensive) week to high school students what is essentially a version of a 12 week graduate school class. Given the time constraints, instructors say that they “highlight the skills that are most important in the marketplace and then let them know what they need to do next to pursue that career path.” Another describes the goal as developing “knowledge in kind, getting them to the point where they say ‘I know I can do this kind of thing. I know the concepts well enough to keep learning.’ It is like becoming literate.” The result of this “literacy” approach, as one stakeholder put it, is that “with very few exceptions graduates are not realistically able to walk into an entry-level technology position, sit down, and succeed. But it gives them the baseline knowledge and the confidence that they can pick up whatever specific skills are required very quickly. They have learned how to learn about technology.” While stakeholders believe strongly that “there is an incredible learning curve both of skills and new perspectives,” it is clear that showing students new possibilities and raising their aspirations is at least as important a curriculum goal in this model as building specific skills.

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Student support: InfoLink invests in a high level of student support to help students make it through a program that is almost certainly far more rigorous than anything they have experienced before. Evidence of the program's demands and thus the need for vigilant student support was provided at a recent professional development seminar: when the guest speaker asked how many students had felt like dropping out of the program at some point, every student, without exception, raised their hands.

The program holds students to a high standard of accountability by tracking punctuality, attendance, and the completion of tasks and tutorials, and following up with students and their parents immediately if there is a problem. While this system makes it clear to students that they will be released from the program for failing to fulfill their commitments, it also provides second chances: "We cut them a lot of breaks to hold onto them long enough for them to get the message. We keep our promises to them and show them we care enough to follow up over and over- that is something that is missing in a lot of their lives." They have found that the key to maintaining the right balance between accountability and support is to always "maintain the credibility of the accountability process by dropping students with three unexcused absences." To do otherwise, they feel strongly, would send the wrong message and be a disservice to students who have worked hard to fulfill their commitment. The program works closely with students, however, not to let them get to that point.

The formation of mentoring relationships is another aspect of InfoLink's student support system: "Through close interactions with adults we try to break down barriers and intimidation. We try to treat them as equals or professionals through simple things like being on a first name basis, letting them know we are available to them outside of class, taking them to the cafeteria to show them they can fit into a college environment."

Stakeholders suggested that student support is particularly crucial in preparing students for their internships: "At first we were not as sensitive as we should have been to what it would be like for a 17 year old from an all-black world suddenly being the only black face in an all-white downtown firm. We have realized we need to be more explicit about what to expect and how they should handle themselves. We need to be upfront about the differences, even little things that we might take for granted."

Professional development: As InfoLink has evolved, program stakeholders have realized and responded to the need to reinforce students' technical skills with what they refer to as "professional development" activities. This term refers to a broad swathe of life skills and knowledge needed to help students function in sometimes alien academic and professional environments. Components include:

- Information about applying to college and seeking financial aid;
- Resume writing and interview skills
- Professional dress, posture, handshakes, etc.
- Coaching on how to interact and solve problems in the workplace, for example how to ask the boss questions and clarify expectations in a constructive way.

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Program stakeholders describe the increasing emphasis on professional development as a necessary response to the attitudes that many students bring into the program: “Many come in with chips on their shoulders or highly intimidated and need some real work on behaving professionally.” Stakeholders were also “amazed at what they didn’t know- basic things like how to manage their paychecks by opening a checking account. We realized we can’t take anything for granted.” InfoLink has responded to these deficits by beefing up the professional development component of the model, thereby giving students a chance to successfully apply the more technical skills.

University environment: There is some internal disagreement among program stakeholders as to how critical the program’s location at a university is to its success. This is a crucial question for potential dissemination and replication of the model- could the program be implemented by another type of host (for example a community college or a non-profit organization) and have the same impact? Although some stakeholders did not see the university location as vital, the majority argued that the setting is crucial for achieving the outcomes beyond technical skills that the program targets. Reasons stakeholders gave for why the university setting is an important component of how the program works included:

- It “sends the right message” and builds confidence in the students to see the faculty of a prestigious university willing to invest time in them and take them seriously.
- Many participants are completely unfamiliar with and intimidated by a university campus. Having the program on campus “gives them a chance to see all the resources of the university and how they can be a part of that.” Thus the program’s location is critical to raising participants’ aspirations.
- University faculty have “fewer preconceived notions about what these kids can do.” Instructors say that they “try to treat (participants) like we treat our grad students and they rise to it.” “It wouldn’t work to have the same high school faculty they see every day delivering this curriculum- the teachers are always surprised by how much we expect and that the students can deliver.”
- Using university faculty provides participants with “extensive exposure to real experts.” This gives them a “sense of the field which is more important than the technical information being taught out of a book.”

As a whole, these arguments reinforce the central contention of stakeholders that what makes this program work is a lot more than the curriculum. It seems clear that for the low-income 11th and 12th graders InfoLink currently targets, the university setting is critical to the program. The program’s current participants are students who are actively deciding their post-high school futures and may never have imagined themselves on a university campus. Were the same curriculum to be used with a different student population, as it is this summer in a “technology camp” enrolling younger and less disadvantaged students, the setting might not be as critical to the program’s effectiveness.

Team projects: Towards the end of the classroom component of the summer, students have the chance to apply and synthesize their skills in a group project. Whenever possible these projects have a specific client, generally a community and/or non-profit organization. This gives students the chance to see immediately how their skills can solve real problems for real organizations.

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The projects are structured to be highly self-managing (along the lines of the “professional training” model discussed above), providing students with vital management experience in working in teams, negotiating with a client, defining a problem, and implementing a solution using multiple kinds of software. Working for a community organization shows students that their new information technology skills are relevant not just in the business world but can also benefit the community.

Internships: Midway through the summer curriculum, students are placed in internships in local high tech and/or technology-using organizations. They begin by working at their internships in the afternoons after attending morning classes at CMU. Once the formal curriculum is completed, students may work full time at their internships up to a maximum number of hours. Like all internship experiences these are designed to give students an immediate opportunity to reinforce their learning by applying their skills in a professional environment. Unlike most internships, however, InfoLink’s provide a relatively high hourly wage rate (\$8/hour in the summer of 2000). The program believes it is important to pay students a competitive market wage for the skilled work they do.⁴ Stakeholders say that well-paid internships are central to the message the program is trying to send: “You learn something of value and you are rewarded immediately. These skills are not just academic- they pay off.” This message is crucial to reinforcing students’ motivations and aspirations to continue in a high tech career.

In recent summers InfoLink has moved from assigning students to internships to having them go through an interview process. InfoLink prepares a directory of all participating firms, including what the organization does, their URL so the student can do further research, a job description of what the intern can expect to do, and a list of the kinds of software they will work with. Stakeholders report that the interview process (including researching companies, writing resumes, and practicing interview skills) has valuable professional development and confidence-building aspects for students and results in a better match for both students and companies.

Stakeholders agreed that the internships are a critical part of how InfoLink works because they give students “a supported transition to a professional environment- it gets them out of their neighborhoods and shows them they can fit in downtown and apply their new skills.” They also agreed, however, that they are “one of the hardest components to get right.” Part of the difficulty is finding opportunities where students will be given “real work that uses their skills, not just filing.” Stakeholders note that recruiting companies where students will be given meaningful work requires a significant investment of program time year round. Beyond recruiting the right companies, making the internship component of the model successful requires clear communication of expectations and on-going monitoring and follow-up. Having a clear, written job description, as the program now does as part of the interview process, helps participating firms do appropriate advance planning to “ensure that there is meaningful and appropriate work to be done- that the company isn’t just taking the student out of social responsibility but not really doing anything with them.” Another stakeholder explained that they ask companies to

⁴ The arrangement to make this market wage possible is somewhat complex: students are actually paid by the high schools using money from the YouthWorks federal grant initiative for internships for low-income teenagers. Participating firms then contribute half of the pay back to YouthWorks to offset the cost of the internships.

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provide the intern with a “on-on-one mentor-type relationship,” but that doesn’t always happen and “with no supervision the internship can be a disaster.”

Stakeholders generally agreed that the program needs to build more accountability into the internship process to “make sure they have sufficient structure to be a learning opportunity.” This summer more of that accountability is being built in by enhancing the roles of the student coordinator and the teaching fellows in the internship process. The student coordinator speaks with internship supervisors on average twice a week, and the coordinator and fellows are making site visits to all locations to provide ongoing support to both students and intern hosts.

High school partnerships: As discussed in the section above on recruiting participants, InfoLink works through long-term partnerships with underprivileged high schools. At this point, the partnerships serve largely as a recruiting mechanism, and there is little follow-up during the school year. However, stakeholders see the high school partnerships as potential vehicles for reinforcing InfoLink’s goals throughout the year and reaching students beyond those who participate in the summer program. In recent summers the program has been developing the role of “teaching fellows,” teachers from the partner high schools who go through the curriculum with students and also get involved in administrative aspects of the program.⁵ The hope is to use these teachers as a vehicle to “influence the culture and curriculum of the high schools.” One stakeholder described the strategy as to “not replicate (the program) but infiltrate (the high schools)” by creating a critical mass of high school teachers who are comfortable with these professional technologies and use them in their curriculum. The program also hopes to influence teachers by exposing them to information about high tech careers that are available to students and by “showing them these kids can do more than they thought possible so that they will begin to demand more from them.”

For the next program cycle, InfoLink is considering expanding the year-round aspect of the high school partnerships by offering school-based computing classes in partnership with the local community college system.⁶ The scenario under consideration would involve

- (1) Recruiting a larger set of students in November;
- (2) Having those students take an Introduction to Computers course taught at their school sites at night during January-April. This course would be taught by community college faculty and receive course credit in their system;
- (3) Students wishing to continue would move on to the InfoLink summer program, receiving additional course credit; and
- (4) InfoLink graduates who are returning to high school as seniors could take community college courses for free during their final year of high school and enter college with advanced placement.

This model would both give InfoLink a stronger presence in high schools, which should be an advantage for recruiting, and allow students to test the program in a less intensive fashion,

⁵ One stumbling block in developing the role of teaching fellows has been finding appropriate incentives to recruit and retain them. In future summers InfoLink is hoping to negotiate a deal that would allow teachers to count InfoLink participation towards the continuing education credits they must receive to maintain their certification.

⁶ This scenario would also help to comply with federal guidelines that funds from the YouthWorks program- InfoLink’s local partner/sponsor for the internship component of the program- should have year-round follow-up.

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which should help to screen for the interest and commitment needed to complete the summer component.

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(3) Short-term outcomes

The suite of program interventions detailed above is designed to produce three kinds of immediate outcomes for students. These interrelated short-term outcomes, program stakeholders believe, are the necessary building blocks of the long-term educational and occupational outcomes that are the program's ultimate goal. The short-term outcomes InfoLink aims to produce in participants are:

- **Technology skills:** As described above in the section on InfoLink's curriculum model, the program maintains a delicate balance between providing students with broad exposure to a variety of software and building immediately useful skills. Because of the ambitious scope of the curriculum and the highly compressed nature of the summer intervention, the goal here might better be characterized as "literacy" in the software covered than fully developed skills. According to stakeholders, participants should come out of the program with a clear understanding of the basic logic of each type of software, a sense of the kinds of professional purposes for which it could be used, and enough hands-on comfort with it to continue learning. One stakeholder described the skills goal as "instrumental, not the focus," confirming the general agreement that the skills goal was secondary to the goal of building students' aspirations and confidence about technology. A stakeholder noted that it is precisely for this reason that the program does not grade or test students on their skills at the end of each unit.
- **Knowledge about high tech careers:** By the end of the summer experience, students should have greater knowledge about the kinds of jobs that utilize technology and what it takes to get them. One stakeholder noticed that many students come in with a general notion that computers are increasingly important in educational and economic success but only the vaguest sense of what "doing computers" actually entails in the real world. Part of the goal here is simply to broaden students' horizons by giving them information about careers they may not have known existed. The program also aims to give students tangible information about the career paths leading to high tech occupations- what specific kinds of computer skills and additional formal education they are likely to require. This is an important complement to the other short-term outcomes because it provides a concrete target for students' new skills and raised aspirations. Internships are obviously an important component of building this knowledge, as are the field trips that the program takes to high tech companies and the kinds of uses for the software that instructors discuss and model in the classroom.
- **Increased aspirations and confidence:** Stakeholders agreed that raising students' aspirations and confidence was the most important short-term goal of the program. They described a number of different desired aspects or manifestations of this attitudinal change:
 - Building overall self-esteem;
 - Reducing the extent to which students are fearful of or intimidated by technology and/or higher education;
 - Helping students see themselves fitting into higher education and professional/business settings;

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- Increasing participants' confidence that they can continue to learn about and use technology ;
- Broadening students' awareness of options for their future;
- Instilling in students the idea of a career, not just a job: "They need to see that work can be fun and meaningful and creative- not just for paying the bills. This is a professional class idea that is probably new to them- most of the adults in their life do not have that orientation to work";
- Raising students' expectations for themselves/instilling ambition; and
- Helping students develop a sense of direction, a vision of what they are going to do with their lives, and the belief that they have made positive steps down that path

Although stakeholders agreed that these attitudinal or "soft" outcomes were more central to the program than hard skills, they emphasized the necessary relationships between hard and soft outcomes. Self-esteem and aspirations are raised not in a vacuum or through empty affirmation but by giving students tools and experiences that show them they can make it in the new economy.

The interrelationship of these three short-term outcomes raises an important evaluation question. Stakeholders suggested that the skills goal plays an instrumental role in helping students reach the central confidence/aspirations goal. The question is whether the program's "exposure" or "literacy" curriculum model provides students with skills that are sufficiently well honed to enable them to meet their own newly raised educational and occupational aspirations.

In terms of timing, stakeholders said they expected measurable differences in these short-term outcomes by the end of the summer intervention. They also emphasized, however, that these effects should continue to build over time as students continue to realize the value of the program and apply it in different contexts. Thus it will be necessary for the evaluation to measure these outcomes in both the short and long terms.

(4) Long-term outcomes

InfoLink's intense and multifaceted intervention, detailed in Section 2, and its desired short-term outcomes of improved skills, knowledge, and attitudes, described in Section 3, are all engineered to lead to a set of rather straightforward long-term outcomes for students:

- **Improved educational attainment:** It is expected that InfoLink graduates will go on to seek and attain more formal education than their peers or than they would have without having participated in the program.
- **Increased occupational and economic success:** Graduates will seek and hold "better" jobs than they otherwise would have, "better" in the sense of jobs that are well compensated, allow students to engage in meaningful/creative/fun work, have high professional status, and have prospects for a rewarding career path.
- **Becoming community leaders/role models:** Stakeholders described their hope that the program will have "ripple effects" by showing younger siblings, friends, and other members of the students' peer group and community that one of their own can "make it" in the previously foreign high tech world.

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It is important to note that the long-term outcomes targeted by InfoLink are common to many programs working with at-risk students and are not specific to technology. The InfoLink model posits that technology is an especially effective vehicle for achieving these outcomes, but it is always instrumental, not an end in itself.

Evaluation Questions:

In general, evaluators seek to answer two kinds of questions raised by a program's theory:

- **(How effectively) is the model being implemented?**
- **Does the model work? (Does it produce the stated outcomes?)**

In addition to these two broad questions, the InfoLink evaluation will seek to answer a number of specific questions raised by the program theory presented in this document. Evaluation questions specific to each component of the model include:

PARTICIPANTS	<ul style="list-style-type: none"> a) What student population does InfoLink serve? What characteristics do they bring to the program that may be important to how the program works? b) Has the population served by the program changed over time? c) How are students who drop out of the program different from students who graduate? What does it take to stick it out?
INTERVENTIONS	<ul style="list-style-type: none"> d) Which components do participants believe are most useful (immediately, in retrospect)? e) How could individual components be improved? f) Should the mix of time/resources devoted to each component be shifted?
SHORT-TERM OUTCOMES	<ul style="list-style-type: none"> g) What is the impact on students' software/technology skills? h) What is the impact on students' knowledge of the high tech economy? i) What is the impact on students' aspirations and confidence? j) For what kinds of students does the program have the most/least immediate impact?

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LONG-TERM OUTCOMES	<ul style="list-style-type: none">k) What are graduates educational attainments? How do they compare to those of their peers?l) What are graduates occupational/economic attainments? ? How do they compare to those of their peers?m) Is there evidence that graduates serve as leaders/role models in their communities?n) For what kinds of students does the program have the most/least long-term impact?
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