

# Toward an Internet-driven, Theoretically-based, Innovative Approach to Sex Education

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*Sex education is aimed at equipping individuals with sex-related information, motivation, and behavioral skills that will enable them to avoid sex-related problems and to achieve sexual well-being. Existing sex education programs are generally delivered via relatively passive classroom-based pedagogical techniques and are questionably effective in achieving their aims. The current discussion calls for the development of an Internet-based, theoretically-driven, innovative approach to sex education. This approach weds the special strengths of the Internet as a rich, interactive, individualized pedagogical tool with the strengths of well-validated behavioral science theory in order to provide effective sex education to large numbers of individuals in a very cost-effective fashion. The proposed approach is based on the Information—Motivation—Behavioral Skills model (J. Fisher & Fisher, 1992; W. Fisher & Fisher, in press), and exploits the characteristics of anonymity, availability, affordability, acceptability, and aloneness of using the Internet. Within this approach, learners are first individually assessed in terms of information, motivation, and behavioral skills deficits that are relevant to the individual's sexual problems and sexual well-being. Learners then participate in individually targeted sex education activities—utilizing relevant materials including text, multimedia components, and links to associated sites—which address the individual learner's empirically identified needs and goals. The article concludes with a call for development and evaluation of innovative, Internet-driven, theoretically-based approaches to sex education.*

Emerging technologies are often adopted in educational settings to make instruction more effective and engaging. This has been true historically, for instance, of the introduction of film, television, and video technologies into the classroom. More recently, computers have contributed to an emerging revolution in technology-assisted education. Computers provide an optimal means for storing, searching, and retrieving educational materials, and for composing and editing written work. Critically, computers also permit self-directed and individualized instruction and feedback in almost any area of interest. The emergence of the Internet affords very widespread access to computer-assisted “e-learning” or “cyberlearning” opportunities (Barron & Ivers, 1996; McCormack & Jones, 1997; Starr, 1997).

Benefits of Internet-based educational technology for complementing standard educational practices may be numerous. For example, in crafting Internet-based educational materials, significant resources may be efficiently invested in creating instructional programs that provide expert instruction to a very large audience in an extremely cost-effective fashion. Such educational materials may also be regularly updated and upgraded to deliver state-of-the-art instruction on a continuous basis. Internet-mediated e-learning also enables those who reside in remote locations

or who are physically confined to receive varied educational programming of high quality. Moreover, because Internet-based educational websites connect with numerous additional sources of information, e-learning technology can access content to fit a very wide range of learner needs and interests. Internet-based educational technology, as part of the World Wide Web, can also access multiple types of media, allow rapid communication between learners and instructors, and enable “classroom discussions” among physically isolated learners.

The advantages of Internet-driven educational technology are applicable to any area of instruction, but there are specific subjects that may benefit more than others from Internet-assisted teaching. One such subject is sex education, an area of instruction that may profit dramatically by exploiting the Internet's unique characteristics to reach its particular goals.

Sex education—aimed at equipping individuals with sex-related information, motivation, and behavioral skills that will enable them to avoid sex-related problems and achieve sexual well-being—has been advocated for decades. Although the scope and methods of sex education are broad and varied and often differ as a function of cultural, political, and religious considerations, sex education of some kind is believed to be necessary in most societies (McKay, 1998). Typically, sex education includes topics relating to the biological aspects of sexuality and the prevention of unwanted pregnancies, sexually transmitted disease, sexual exploitation, and sexual assault, and may (as

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policy permits) also focus on interpersonal relationships, sexual orientation, and sexual function.

Although sex education programs are numerous and their methods diverse, and much effort and many resources have been invested in sex education, its effectiveness—in terms of engendering actual change in learners' behaviors—has been questioned (e.g., Dailey, 1997; J. Fisher & Fisher, 1992; Franklin & Corcoran, 2000; Grunseit, Kippax, Aggleton, Baldo, & Slutkin, 1997; Kirby & Coyle, 1997). Reviews of sex education efforts have pointed out that most involve information-only interventions which entirely ignore the issue of individuals' motivation to apply what has been learned and the behavioral skills required for applying sex education lessons effectively in real-world situations (J. Fisher & Fisher, 1992; 2000; W. Fisher & Fisher, 1993, 1999). The current discussion focuses on exploiting the multiple capabilities of the Internet to deliver near optimal sex education which more successfully addresses individuals' sex-related information, motivation, and behavioral skills needs, in relation to their sexual problems, sex-related risks, and sexual well-being.

It is well recognized that there are specific circumstances that may enhance learning across most topic areas. Such circumstances involve environmental factors (e.g., class size, availability of textbooks), instructor capabilities (e.g., knowledge of pedagogic principles, comfort level), and learner characteristics (e.g., intelligence, study skills), in interaction with an effective curriculum. Because sex education is a sensitive and value-laden enterprise that is often aimed at the challenging objective of behavior change, sex education may require not just special but unique environmental conditions, teacher characteristics, learner characteristics, and curriculum elements.

In relation to environmental factors, special characteristics required in the sex education context may include a setting for learning about sensitive sexual issues that is perceived to be private and respectful. Unique characteristics of sexuality educators are also required and involve threshold levels of comfort with sexuality (Yarber & McCabe, 1981), willingness to withhold personal judgments, sophisticated knowledge of sex-related scientific developments, and skill in the area of group communication processes. Special characteristics are required of learners in the sex education context as well and involve at least a threshold level of comfort with sexuality which is required to attend to, retain, and retrieve sexual information (W. Fisher, Byrne, & White, 1983; W. Fisher et al., 1988). Learners' comfort levels with sex education may be enhanced by environmental conditions of privacy and anonymity, and by instructors who are sensitive and skilled at protecting learners from stigmatizing reactions. These same environmental conditions and instructor parameters are conducive to individual expression and exploration of solutions to sensitive sex-related problems. Finally, in interaction with optimal environmental, teacher, and learner characteristics, an effective sex education curriculum is necessary to provide the sort of information,

motivation, and behavioral skill inputs which are likely to be useful in learners' efforts to avoid sexual problems and to achieve sexual well-being. It is our belief that the Internet can be harnessed to provide many of these unique requirements for effective sex education.

### SPECIAL CHARACTERISTICS OF INTERNET USE

The study of the characteristics of the Internet and of Internet-user interactions is a new field of research (Gackenbach, 1998; Wallace, 1999) and social scientists are gradually developing an understanding of essential issues in this area. Internet-mediated interpersonal communication, and the direct and immediate availability of rich information resources on demand, constitute two main factors of special psychological relevance by which the Internet has changed human culture and experience.

What makes Internet browsing and communication different from information retrieval and communication via more traditional channels? Why is the Internet so attractive for these purposes? A review of the literature reveals several characteristics of the Internet that are to a large degree unique and that appear to contribute to its attractiveness and impact. Cooper (1998); Cooper, McLoughlin, and Campbell (2000); and Cooper and Sportolari (1997), have conceptualized the Internet as possessing a "Triple A Engine." *Affordability* refers to the Net's low cost, which has permitted it to penetrate many segments of society. *Availability* refers to the Net's ease of use at any time and in many locations. *Anonymity* refers to the apparent obscurity of the Net's users. Together, affordability, availability, and anonymity comprise the "engine" that attracts Internet users. King (1999) has added a fourth factor, *Acceptability*, which refers to the Internet's legitimacy, or the normative acceptance of the Web as a standard educational and entertainment tool, that also contributes to the Internet's attractiveness and widespread use. In addition, we believe that still another major characteristic should be added to the list of Internet attributes: *aloneness*, referring to the fact that the Internet is typically used privately in unobserved human-computer transactions. Thus, the Internet may possess what can be termed a *Penta-A Engine* (Barak & Fisher, in press). These characteristics parallel Suler's (2001) analysis of unique parameters of Internet-related behaviors.

Other writers have elaborated additional characteristics of the Internet which have psychological significance and which may also be relevant to its use in sex education. Specifically, McKenna and Bargh (2000) noted that the Internet eliminates the factor of physical appearance in the development of relationships. There is also greater individual control over the occurrence and pace of interpersonal interactions (see also Young, Griffin-Shelley, Cooper, O'Mara, & Buchanan, 2000). In addition to these interpersonally relevant characteristics of the Internet, we must also keep in mind that Internet technology possesses special features that make information retrieval vastly more efficient, immediate, and reinforcing than any previous information management system in human history

(Barron & Ivers, 1996; Newhagen & Rafaeli, 1996; Sudweeks, McLaughlin, & Rafaeli, 1998). The special features of the Internet have been harnessed to provide numerous successful psychological and educational applications (Barak, 1999; Fink, 1999; Grohol, 1998).

The unique characteristics of the Internet not only serve to explain attraction to and intensive use of cyberspace, but—as outlined in this article—they may also serve to make Internet-based approaches to sex education considerably more effective than traditional approaches in this area. The thrust of the current paper is that sex education can be significantly improved in many important aspects if the Internet becomes a vehicle for the delivery of theoretically based, individually targeted sex education interventions to complement other educational approaches.

#### USE OF COMPUTERS AND THE INTERNET AS EDUCATIONAL TECHNOLOGIES

Although there are superficial similarities between the use of personal computers with specialized local software and Internet technology, we note that there are significant differences between the two modalities that bias us strongly in favor of Internet use for educational purposes. First, an Internet site, in contrast to local software installed on an individual personal computer, allows for centrally based and periodic revisions, updates, and upgrades of educational materials and methods. In this way, instructors can be certain that all learners are using the most advanced version of an educational intervention, and updating can be accomplished cheaply and automatically. Second, Internet-based learners are not confined to a certain computer at a certain location, but can connect to a website and use an instructional program anywhere and anytime an Internet connection is available. Third, the Internet allows for exchange of information among users, a capability that can be critical to learning experiences, especially in topic areas influenced by social norms and interpersonal interaction, such as sexual behavior. Thus, for example, the ability of the Internet to collect and disseminate data showing that participants in an HIV education intervention actually favor a social norm of condom use can be communicated to other intervention participants and can actually become part of the intervention itself. At the same time, interactive communication could potentially contribute to creation of sexually risky or inappropriate norms. Consequently, moderated discussions with the potential for instructor intervention would be required to ensure that appropriate messages are delivered. Moreover, the Internet's information collection and exchange capability makes Internet-based educational interventions exceptionally suited to the collection of evaluation research data. Finally, Internet-based education can provide access to information resources outside a specific instructional site, and is thus able to marshal essentially any preexisting relevant material on the Internet in the service of optimal education. For these reasons, Internet-based education programs have considerably more strengths than local personal computer-based education software.

A number of studies suggest the effectiveness of Internet-based educational technology (see, for example, Graham, 2001; Lu, Zhu, & Stokes, 2000; Mistler-Jackson & Songer, 2000; Shackelford, Thompson, & James 1999; Waschull, 2001). These studies have utilized multiple techniques to evaluate the impact of Internet-assisted educational approaches, including comparisons of Internet-assisted to traditional learning strategies. Most if not all of these studies show positive results, with Internet-assisted learning of new information at least as effective as traditional learning strategies, if not significantly better. In addition, evidence in many cases suggests that students find Internet instruction to be more satisfying and engaging than traditional learning modalities. We note, however, that most of this research has been carried out in university student samples, and the generality of these effects is not yet known.

Beyond purely didactic Internet-assisted learning, psychoeducational use of Internet technology has also been explored. Barak and Wander-Schwartz (2000); Rollman, Krug, and Parente (2000); and Soukup (1999) all showed that the use of a Web chat room can be an effective venue for psychological assessment and intervention, and Preece (1999) has described how online communities can develop empathic communications, involving both factual and emotional interactions.

#### USE OF COMPUTERS AND THE INTERNET IN SEX EDUCATION

A number of researchers and educators have advocated the use of Internet-based educational interventions for sex education purposes (Barak & King, 2000; Barak & Safir, 1997; Cooper, 1998; Cooper et al., 2000; Cooper & Sportolari, 1997; Gotlib & Fagan, 1997; Harry & Snobl, 1998; Khalib, 2000; Lunin, Krizanskaya, Melikhova, Light, & Brandt-Sorheim, 1997; Roffman, Shannon, & Dwyer, 1997). Others (Cooper, Scherer, Boies, & Gordon, 1999; Fisher & Barak, 2000) have noted that due to the current paucity of Internet-based sex education websites, it is actually pornographic websites and online sex shops that provide the bulk of Internet-based "sex education" at the present time. Although Internet-based sex education websites are not yet common, several are available to the general public, and descriptions of such websites follow.

*SexualHealth.com* (<http://www.sexualhealth.com>), owned by the Sexual Health Network, describes itself as "dedicated to providing easy access to sexuality information, education, mutual support, counseling, therapy, healthcare, products, and other resources for people with disabilities, illness, or natural changes throughout the life-cycle and those who love and care for them." The site offers comprehensive and current information on various topics related to human sexuality (e.g., sexual addiction, sexual dysfunction), provides answers to users' questions (provided by experts), and includes discussion forums. Obtaining information on this site is cumbersome, however; the use of pictures or graphics is minimal, and multimedia capabilities are not employed at all. Moreover, the

discussion forum requires registration of identifying information, and thus compromises user anonymity and likely reduces their inclination to use this part of the site. Finally, the question and answer function may serve more to promote the experts' services than to provide useful advice.

*TeenWire* (<http://www.teenwire.com>), operated by the Planned Parenthood Federation of America, is a colorful website that tells its users that "this is your private place on the Internet where you can get information and news about teen sexuality, sexual health, and relationships." The site does indeed provide a rich body of information on relevant topics ("How can I get on the pill?" "What about abortion?" "Penis: An owner's manual"). The site provides experts' answers to teens' questions; employs pictures, graphics, and multimedia; conducts periodic polls of users' views; and provides a referral service to clinics. This site encourages users to register, but despite promises of privacy, registration may deter teens from becoming active users of this service.

*Iwannaknow.org* (<http://www.iwannaknow.org>), run by the American Social Health Association, also provides relevant sex-related information for teenagers in a user-friendly and easy-to-navigate site. Although information is provided in a very clear fashion, no use of any pictures, graphics, or multimedia is employed, and long and fatiguing texts are the site's mainstay, making learning dull and effortful. The site does include two unique and significant features. Attractive interactive games test users' knowledge of sexuality topics (and provide users with feedback), and a chat room is open daily for users to exchange information. (For further discussion of Internet sex education websites, see Gotlib and Fagan (1997), who have reviewed Internet sex-education resources.)

Assessment of the effectiveness of Internet-based sex education is in its infancy, but some data do exist concerning this issue. For example, Seidner, Burling, and Marshall (1996) found that a multimedia software package significantly increased HIV/AIDS knowledge in high-risk populations. In addition, Thomas, Cahill, and Santilli (1997) found that HIV/AIDS prevention negotiation skills could be acquired and refined through interactive computer-game procedures. Also in this regard, Paperny (1997) conducted large-scale survey research focusing on computer-based sexual health assessments and individualized patient feedback in large samples of adolescents. Paperny's data indicate that adolescents accept and are satisfied with the use of personal computers in this sensitive area.

In addition to computer-assisted sex education, computer-mediated sex counseling and sex therapy applications have been demonstrated as well. For example, Goodson, McCormick, and Evans (2000) and Ochs and Binik (2000) have illustrated the use of sex-related assessment instruments via the Net, and McKenna and Bargh (1998) have demonstrated that empowerment and coming-out processes for homosexuals can be facilitated by Internet-based communications. We note, however, that broad tests of the effectiveness of Internet-based sex education applications,

and competitive tests of the effectiveness of Internet-based versus classroom-based sex education modalities, do not appear in the literature and are critically needed. Taken together, however, existing evidence supports the possibility that innovative use of the Internet can prove effective in terms of scope, efficiency, quality, and impact of sex education efforts.

#### A THEORETICAL APPROACH TO SEX EDUCATION: THE INFORMATION—MOTIVATION—BEHAVIORAL SKILLS MODEL

A basic premise of the current analysis is that sex education should optimally be based upon well-developed and well-validated behavioral science theory. Accordingly, we have chosen the Information—Motivation—Behavioral Skills (IMB) model (J. Fisher & Fisher, 1992, 2000; W. Fisher & Fisher, 1993, 1999, in press) as the conceptual foundation of the Internet-based approach to sex education under discussion. The IMB model is based on an analysis and integration of theory and research in the social psychology and health psychology literatures (J. Fisher & Fisher, 1992; W. Fisher & Fisher, 1993), and it focuses comprehensively on the set of informational, motivational, and behavioral skills factors that are conceptually and empirically associated with the performance of sex-related problem-prevention and wellness-promotion behaviors (J. Fisher & Fisher, 2000; W. Fisher & Fisher, 1999). Moreover, the IMB model specifies generalizable procedures for applying this conceptualization to the creation and evaluation of empirically targeted interventions. The IMB model has been empirically successful in predicting diverse sex-related preventive practices across populations at risk (e.g., J. Fisher, Fisher, Williams, & Malloy, 1994; W. Fisher, Williams, Fisher, & Malloy, 1999). In addition, IMB model-based intervention research has produced significant and sustained reductions in sex-related risk behaviors over time and across populations (e.g., J. Fisher, Fisher, Bryan, & Misovich, in press; J. Fisher, Fisher, Misovich, Kimble, & Malloy, 1996). For these reasons, the IMB model appears to be a sound conceptual and practical basis for development of a theoretically based, Internet-driven approach to sex education.

According to the IMB model, the learning of *sexuality-related information* that is directly relevant to sexual problem-prevention or sexual well-being promotion is a prerequisite to action in these areas. For example, HIV-related information that is closely linked to sexual problem prevention might include facts about HIV (e.g., "Oral sex is much safer than vaginal or anal sex") that could facilitate preventive behavior performance. Similarly, facts about sexual function (e.g. "Stroking your clitoris is a very good way to see to it that you have an orgasm") may also be readily translated into behavior in the service of sexual well-being.

*Sexuality-related motivation* is a second determinant of whether even well-informed individuals will be inclined to act on what they know about avoiding sexual problems or

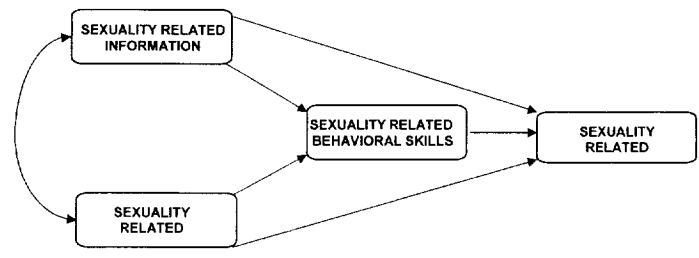
achieving sexual well-being. The IMB model assumes that personal motivation to practice specific sex-related behaviors (attitudes toward the personal practice of specific preventive behaviors or specific behaviors serving sexual well-being) is one critical motivational factor to consider. Social motivation to practice sexual problem-prevention or wellness-promotion actions (perceptions of social support from significant others for performing these acts) is an additional central motivational factor to consider.

*Sexuality-related behavioral skills* constitute an additional fundamental determinant of whether well-informed and well-motivated individuals will be capable of acting effectively in the service of avoiding sexual problems or achieving sexual well-being. The behavioral skills construct of the IMB model focuses on an individual's objective ability, and his or her sense of self-efficacy, in performing sexual problem-prevention or well-being related behaviors. Such behavioral skills can involve perceived and objective abilities for insisting on and maintaining abstinence from intercourse, discussing and practicing contraceptive and safer sexual behavior, and discussing and implementing sexual behaviors that will optimize a couple's sexual pleasure.

The IMB model thus asserts that sexual information, motivation, and behavioral skills are the fundamental determinants of the performance of actions that are instrumental in avoiding sexual problems and promoting sexual well-being. To the extent that individuals are well-informed, are motivated to act, and possess behavioral skills required for acting effectively, they will be likely to practice sexual problem-prevention and wellness-promoting behaviors. To the extent that individuals are uninformed, unmotivated, and unskilled, they are expected to be unlikely to engage in behaviors that result in sexual problem prevention or sexual well-being.

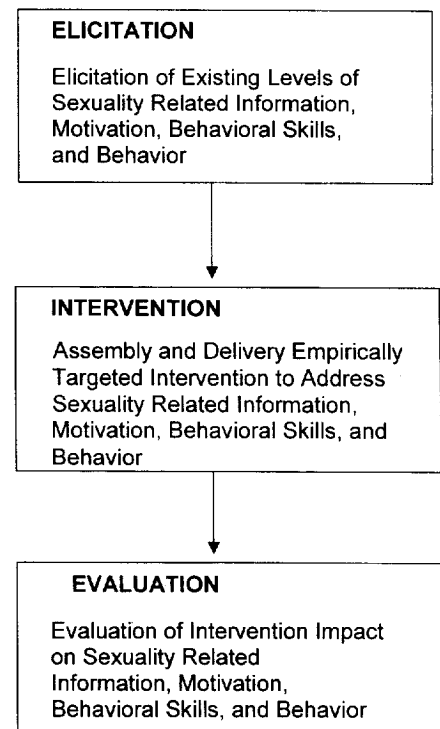
From the perspective of the IMB model, sex-related information and sex-related motivation work primarily through sex-related behavioral skills to influence performance of behaviors that result in sexual problem prevention and sexual well-being (see Figure 1). In essence, effects of information and motivation may be seen primarily as a result of the application of behavioral skills to the initiation and maintenance of healthy behaviors. Thus, for example, a female who is knowledgeable about safer sex and motivated to practice safer sex will be inclined to apply sophisticated behavioral skills to negotiate initiation and maintenance of condom use with her partner. In addition, the IMB model specifies that there will be cases where sophisticated or novel behavioral skills are not required for the performance of behavior in which sex-related information and sex-related motivation will have direct effects on sexual problem prevention or sexual well-being related actions. For example, a male who is knowledgeable about safer sex or motivated to practice safer sex can unilaterally put on a condom as a direct function of information or motivation and without the necessity of applying sophisticated behavioral skills to effect initiation or maintenance of behavior.

**Figure 1. The Information-Motivation-Behavioral Skills Model (after J. Fisher and Fisher, 1992, 2000, and W. Fisher and Fisher, 1993, in press).**



The IMB model specifies a set of generalizable operations for constructing, implementing, and evaluating sex education interventions for target populations (see Figure 2). The first step in applying the IMB model consists of *elicitation research*. Elicitation research involves surveying a subsample of a target population in order to empirically identify this population's information deficits, motivational obstacles, behavioral-skills limitations, and general sexual behavior profile, in relation to sexual problems (e.g., unsafe sex, contraceptive neglect) and sexual well-being issues (e.g., orgasmic consistency) of interest. The second step in applying the IMB model involves the design and delivery of *empirically targeted, population-specific interventions*, constructed on the basis of the elicitation research findings.

**Figure 2. The Information—Motivation—Behavioral Skills Model approach to sex education (after J. Fisher and Fisher, 1992, and W. Fisher and Fisher, 1993)**



Such targeted interventions address deficits in information, motivation, behavioral skills, and behavior that have been identified in relation to specific sexual issues at focus. The third step in the process of applying the IMB model involves methodologically rigorous *evaluation research*, conducted to determine whether intervention-induced changes have occurred in regard to relevant sexual information, motivation, behavioral skills, and behavior parameters. The IMB approach to evaluation research involves assessing a number of sources of data, at least some of them nonreactive, and at least some of them collected from intervention participants in a context outside of the intervention per se.

The IMB model has accumulated considerable empirical support over the past decade in studies of the correlates of HIV risk behavior and in experimental intervention research to reduce such behavior (see J. Fisher & Fisher, 1992, 1999; W. Fisher & Fisher, 1993, 1999, in press). With respect to the IMB model's ability to predict HIV risk and preventive behavior, research among university students, gay men, intravenous drug users, minority high school students, lower-income urban minority and White women, truck drivers in the Indian subcontinent, and other diverse subject populations confirms that HIV-prevention information, motivation, and behavioral skills are strongly and consistently related to HIV-preventive behavior. Moreover, these factors account for a very substantial proportion of the variance in HIV-risk and HIV-preventive practices (J. Fisher & Fisher, 1999; W. Fisher & Fisher, in press).

With respect to changing HIV risk behavior, IMB model-based experimental intervention research has documented significant and sustained improvements in HIV prevention information, motivation, and behavioral skills, as well as in HIV preventive behavior, across target populations. IMB model-based elicitation and intervention research has demonstrated significant and sustained changes in HIV preventive behavior in populations of university students (J. Fisher et al., 1996), inner-city minority high school students (J. Fisher et al., 2001; St. Lawrence, Brasfield, Jefferson, & Alleyne, 1995), and African American economically disadvantaged urban women (Carey, Kalichman, Forsyth, Wright, & Johnson, 1997). Preliminary evidence also suggests the utility of IMB model-based interventions for promoting HIV preventive behavior among the chronically mentally ill (Weinhardt, Carey, & Carey, 1997).

#### INTEGRATION OF INTERNET CAPABILITIES AND THEORY-BASED SEX EDUCATION

The proposed approach to theoretically-based, Internet-driven sex education involves integrating the perspective of the IMB model with the special characteristics of the Internet to create an optimal method for delivery of sex education. Specifically, this approach applies the IMB model as a basis for conducting interactive, Internet-based elicitation, intervention, and evaluation research in an innovative approach to structuring and delivering sex education that is targeted at individuals' specific, empirically

identified needs. This approach weds the strengths of the IMB model with the individual focus, interactivity, content quality and richness, accessibility, and anonymity afforded by the Internet. Such Internet-driven, theoretically-based, individually focused sex education could be accessed easily and cheaply by multiple client populations: by help-seeking individual adults or couples, working at home-based computers; by adolescents who have been referred to a website by their family physician or birth control clinic; or by high school students who are carrying out school-based sex education exercises on an Internet website, assigned as homework to be carried out with the assistance of an Internet-delivered curriculum.

In accord with the IMB model, a learner's initial contact with the Internet-driven approach to sex education under discussion would involve accessing a website and participating in individually focused elicitation research, using questionnaire instruments developed for this purpose (see, for example, Amico, Cornman, Fisher, & Fisher, 2001; Misovich, Fisher, & Fisher, 1998). This will enable empirical identification of an individual learner's information, motivation, and behavioral skills relative to his or her individual profile of sexual risk behaviors (e.g., unsafe sex, contraceptive neglect) or sexual well-being goals (e.g., increased orgasmic consistency, reduction in rapid ejaculation). Elicitation questionnaires can be administered to participants online and scored automatically by Web-based software, a method found to be highly acceptable for test-takers, while retaining high levels of test reliability and validity (Barak & English, in press).

Based on elicitation research carried out with a specific individual, the website's executive functions will create an empirically targeted and completely individualized sex education curriculum. This individualized educational experience will take the student through interactive, hyperconnective, multimedia-enriched activities that address each student's specific information, motivation, and behavioral-skills deficits, in relation to his or her specific sexual problem-prevention and well-being concerns. In addition, using appropriate tools, the website will determine when an individual student has reached criterion levels for these determinants of behavior and, in follow-up visits, the website will determine when the individual reaches criterion levels of behavior change that reflect his or her personal needs and priorities. Learners can reaccess the website periodically for further interactive activities, which can serve as reinforcement or booster intervention sessions, and, with appropriate ethical safeguards, as data-collection opportunities for ongoing evaluation of the intervention.

Used in this fashion, the Internet can potentially be exploited as a revolutionary sex education tool with unprecedented possibilities of reach and impact. The Internet's unique capabilities, allowing teaching and learning to become efficient, effective, individualized, and of uniformly high quality over time (Alterkruse & Brew, 2000; English & Yazdani, 1999), are especially relevant to sex education. The Internet's unique capabilities of

anonymity and acceptability are especially relevant to sex education interventions, as sexuality is an area in which privacy is paramount, student and instructor comfort levels crucial, and a broad information, motivation, and behavioral skills based curriculum—rarely if ever delivered—is critical to achieving sexual problem prevention and well-being outcomes. Specific Internet capabilities that increase the scope and impact of sex education interventions and that are completely different from standard instruction include the following:

1. *Interactivity.* An Internet sex-education website is able to communicate actively, reciprocally, and continuously with the learner and with others (e.g., instructors or other users), making sex-related learning a dynamic two-way process, at the same time that it is controlled by the learner and is as private and protected as he or she requires.

2. *Individualized programs.* An Internet sex education website will be able to offer individualized instruction, based upon elicitation research, by assembling educational content that is completely keyed to an individual's needs and priorities.

3. *Multimedia communication.* An Internet sex-education website will be able to access text, sound, still pictures, animation, videos, and other graphic channels, exploiting and engaging human beings' multi-sense capabilities. Multimedia communication may be especially important in the sex education area, as individuals may require rich and involving communications to address information, motivation, and behavioral skills deficits in critical areas.

4. *Hypertextuality and hyperconnectivity.* An Internet sex-education website will be able to access on demand multiple sources of information (e.g., the address of a local birth control clinic, a video of a cesarean section childbirth), vastly enriching information targeted to individual sex education needs, available instantly to any given learner.

5. *Packet-switching.* An Internet sex-education website will be able to create and distribute packages of information (e.g., entire curricula or specific messages, pictures, and text) to mass audiences. This characteristic makes it possible to create and continuously update and distribute Internet sex-education materials in a cost-effective and efficient manner, and to refresh Internet sex-education websites with current, interesting materials to continuously engage user interest.

6. *Privacy, portability, uniformity of quality.* An Internet sex-education website provides an intervention channel that is completely private, portable in the sense that it can be accessed from multiple locations, and of uniform quality, without being subject to the influence of individual differences in teachers' skill or enthusiasm, which are especially critical in the sex education domain (Yarber & McCabe, 1981).

7. *Reaccessing.* An Internet sex-education website will provide the possibility for users to repeat lessons or to seek booster educational sessions. This is especially important

for learners who need to go over certain material again to better comprehend complex topics (e.g., hormone replacement therapy effectiveness vs. side effects) or to gain better control over dyadic sexual situations (e.g., negotiating safe sex with a partner).

8. *Data collection.* An Internet sex-education website can afford the possibility, with appropriate ethical and security safeguards, of using the same channel for intervention delivery and online data collection for evaluation research to determine the effectiveness of sex education interventions.

We propose to apply these capabilities of the Internet as an effective channel for the delivery of conceptually based sex education. As noted earlier, the IMB model calls for an approach that is focused on sexuality-relevant information, motivation, and behavioral skills content and that is targeted as closely as possible to the specific individual's needs in these areas. To date, such targeting has been undertaken via elicitation research within subsamples of a target population to provide a "best estimate" of an individual's information, motivation, and behavioral-skills needs, and of the individual's sexual risk or sexual well-being concerns (W. Fisher & Fisher, 1992; J. Fisher et al., 1996). Over and above such approximations, however, the Internet presents an exceptional mechanism for instantaneously creating an intervention that is targeted specifically at a given individual's empirically identified needs. After identifying an individual's level of information, motivation, behavioral skills, and behavior deficits, relative to specifically diagnosed or self-nominated sex-related problem-prevention or well-being objectives, Internet technology can be mobilized to provide, in a completely interactive and private context, specifically relevant intervention content, utilizing multimedia and hypertextual capabilities to address information, motivation, and behavioral skills deficits. The result is the communication of a conceptually based intervention, delivered by an expert teacher, utilizing a rich, constantly updated, and individualized curriculum, to reduce sexual problems and to promote sexual well-being.

Our proposal is innovative, in that it is different in principle from any other sex-education program to date. The primary idea—to exploit the Net's unique capabilities and and well-validated behavioral science theory in order to provide individually focused sex education—seems to us to be an excellent fit for the area of sex education, for which standard instruction modalities are frequently problematic. Our proposal is also timely, in that the current era is characterized by widespread acceptance and utilization of digital technologies and digital culture (Calvert, 1998; La Ferle, Edwards, & Lee, 2000; Tapscott, 1998; Williams, 1999), and an Internet-based approach to sex education may smoothly integrate into current social trends. Longitudinal evaluation research is needed to examine the impact of the proposed approach, in comparison with traditional pedagogical approaches, in this important area of human behavior.

We note in closing that Internet sex education will face numerous challenges and will encounter both foreseen and unforeseen limitations as it is developed and deployed. First, it would appear that parents play a crucial role in healthy sexual development, and Internet-based sex education could actually unintentionally disconnect parents from this process. An obvious solution to this potential problem is to script parental participation and involvement in Internet-based sex education protocols. This can be accomplished by creating child and parent modules, which require children and parents to interact with one another, in Internet-based sex education approaches. Second, we note that many public establishments—including public schools and libraries—have explicit policy and software controls that prohibit Internet connection with anything even vaguely sexual in nature. Internet-based sex education will have to adapt to both policy sensitivities and to software mechanisms that are constructed to interdict Internet contact with sites containing sexual content. Finally, we note that Internet-based sex education, together with other computer applications, are less likely to reach poorer and disenfranchised populations in the developed and developing world (the so-called digital gap or digital divide), and they are not necessarily the best approaches for persons with limited literacy or intellectual skills. Third, we note that Internet-based approaches to sex education can only stimulate and emulate—but not replace—the face-to-face interactions that are a defining component of social and sexual communication. Although these challenges will need to be addressed in developing the approach to Internet-based sex education we have proposed, the multiple positive attributes of this approach are seen as very likely to drive the growth of the expert, interactive, and accessible sex education we have envisioned.

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