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**ONLINE STUDENT SUPPORT:
DEVELOPMENT AND USER REACTION TO
A WEB-BASED MATHEMATICS ANXIETY WORKSHOP**

by

April Mary Buchanan



A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Doctor of Philosophy

Department of Educational Psychology

Edmonton, Alberta

Spring 2000



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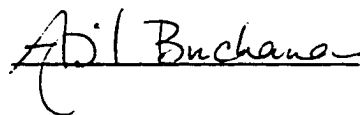
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*For Rosemary Allan,
an excellent mother and role model –
in math, and in life*

ABSTRACT

With college and university students leading increasingly complex lives, the need for greater flexibility in counselling service delivery is growing. One highly promising technological development is delivery of information and instruction electronically via the Internet. The purpose of this research and development project was to apply this technology to student counselling by developing and pilot testing an online mathematics anxiety workshop.

A three-session "Math Study Skills for the Reluctant" group counselling workshop incorporating audio, video, interactive exercises and communication tools, was designed based on a successful live version and developed for delivery via the WebCT (Web Course Tools) online course platform. The workshop was delivered initially within a controlled lab setting with a lab monitor present and counsellor support available via e-mail. An evaluation of workshop effectiveness, participant use of specific workshop features and reactions to the online format was conducted via pre/post Target Complaints ratings, online session evaluations, online tracking records, lab monitor observations and semi-structured final interviews.

Eleven female participants attended the workshop at their own pace over an eight-week period. Following counselling, substantial reductions were reported in the severity of initial complaints and personal gains outcomes were similar to those reported from the live workshop (e.g., increased math-related confidence). The online format was generally experienced as easy to use with self-paced scheduling noted as the most positive aspect and privacy concerns, reading on the computer and insufficient interaction with others given as negative aspects. Mature, independent learners particularly appreciated this delivery method. It was concluded that the effectiveness data and student reactions were sufficiently positive to warrant further controlled use of the online counselling workshop for students who require distance delivery and as a resource for counsellors and educators who frequently work with math anxious students. Recommendations are given for further research relating to the use of online counselling interventions with student populations. Numerous specific suggestions are also offered for the

optimal development and safe delivery of online counselling interventions as a viable option for student services counsellors.

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CHAPTER I

"For Faster Service, Please Take a Number"

It's 2:15, October 3rd at the Student Counselling Services reception desk.

Student: *Hi. I'd like to sign up for the "Math for the Reluctant" workshop – the one on the poster outside.*

Receptionist: *OK ... (pulling out a flyer) Here it is. This one is very popular.*

Student: *Ya, it sounds perfect for me. (laughs)*

Receptionist: *Let's see, ... this section is full ... so's that one. Looks like we'll have to put your name down for one of the workshops next semester.*

Student: *Oh That's when I have to take my math course. Is there any way I can get some help sooner?*

Receptionist: *Well, you might be able to see the counsellor that teaches it. (flipping through the appointment book) It looks like she has a couple of free spaces on Wednesday mornings at the end of the month.*

Student: *I work Wednesdays. ... Is there anything in the evening?*

Receptionist: *No, sorry.*

Student: *(sighs) Well, I guess I'll just have to put my name down and hope I get through it all right. (writes name on list and packs up)*

Receptionist: *(calling out as student leaves) You're welcome to check our shelves for books that might help*

In my work as a college counsellor, this scenario was all too common. Students clamoring to get into already over-full or inconveniently scheduled workshops for the most typical student needs were frequently turned away disappointed. Counsellors and receptionists were left feeling frustrated at their inability to do their job: to help students when they needed it most.

Once in the position of counselling coordinator, I began to see that this problem was likely to continue and even worsen in the long term as student enrollments increased, more students with specialized needs were coming to college, and funding for counsellors was dwindling. Each semester, more students would come needing expert help with career

counselling, learning and study skills training, mature, foreign and disabled student support and subject-related concerns such as writer's block and mathematics anxiety. However, with few counsellors to draw from, it was becoming increasingly difficult to plan a consistently available set of counselling services and to respond to any other than the most generic student needs.

The counselling research literature continues to confirm these perceptions: responding to similar and projected conditions in counselling centers worldwide (see for example, Berger, 1983; Martin, 1996), writers looking toward the future of the counselling profession have long been seeking solutions and calling for change. The conclusion drawn by Lindsay in 1988, for example, seems even more urgent today: "With budget cuts and the increasing ratio of students to counselor, it is imperative that counselors explore other avenues to better serve their clients" (p. 325).

In the past ten to fifteen years, with new technologies applicable to instruction becoming more available and easier to use (George & Camarata, 1996; Gerler, 1995), counselling researchers have increasingly proposed greater use of technology as a partial solution to the current crisis in counselling. Sampson and Krumboltz (1991) for example, have suggested that the use of computer-assisted instruction (CAI) is a "missing link" in the advancement of counselling and that its underutilization is "an important barrier to the effective delivery of counselling services in relation to the stated goals of our profession" (p. 395). More recently, Gerler (1995) has expressed similar concerns in relation to school counselling, which he urges is "desperately in need of imagination and forward thinking that can be aided by the application of computer technology" (p. 8).

One highly promising technological development that may be particularly suited to students with special service needs, is delivery of information and instruction electronically via the Internet, the now ubiquitous international network of computer networks. Development of its subset, the World Wide Web (WWW), allows universal presentation of multimedia documents that can include text, images, animation, sounds and/or videos accessible from a variety of

computer types, and multimedia interactive capabilities (e.g., students can fill out forms, complete and receive feedback from self-assessments, "chat" on-line with other students, print off handouts, read or listen to stories of other students, even see "slide show" or video presentations of lecture material). This technology is now widely accessible with most educational institutions connected to the Internet and more coming on each day, many offering online courses and some business-related sites offering training, tutorials and workshops completely via the Internet (Shotsberger, 1996). Preliminary evaluation of innovative educational web sites such as "Net-Frog" [<http://teach.virginia.edu/go/frog>], an interactive frog-dissection program, and "Virtual Hospital" [<http://indy.radiology.uiowa.edu/VirtualHospital.html>], which allows medical students to diagnose and prescribe treatments for virtual patients, has led to rave reviews from both educators and student users. Given the success of Net-Frog, for example, developers Kinzie, Larsen, Burch and Boker (1996), have concluded: "While valuable instructional products are available for development and distribution via a variety of media, the Internet provides one of the most effective delivery mediums to date" (p. 59).

Although these new technologies are being researched and adopted for educational and business use, as with other forms of CAI (computer-assisted instruction), they are not yet being fully utilized for counselling. In their survey of counselling and counselling-related activities on the Internet, Sampson, Kolodinsky and Greeno (1997), concluded that while there was evidence that counselling was being conducted, the numbers were "relatively small" given the number of counsellors offering services through more traditional means. They further articulated a wide variety of potential counselling applications that could be provided via this new medium, a fact that is beginning to be conveyed by career counselling instructors to a new generation of future counsellors (Hohenshil & DeLorenzo, 1999; Stevens & Lundberg, 1998). Other indicators suggest that small numbers of counsellors in academic settings are taking first steps into this new territory. In a first study of college health information systems on the Internet, Brown (1995) found beginning use of the WWW by college and university counselling centers for information-

delivery (e.g., virtual "pamphlets") and general advice for common student questions (e.g., "Ask Uncle Ezra", Cornell University's electronic Q&A service). Today, this use continues, but while many more student counselling centers have a "storefront" web page from which they can provide students with campus counselling information and links to a growing number of career and health-related Internet resources, they still have little to offer in terms of online student support service.

Given the enthusiastic endorsement of Internet technology by educators and growing interest from counsellors, I began to envision the possibility of a new scenario taking place at our counselling services reception desk:

Student: *Is there any way I can get some help sooner?*

Receptionist: *Yes, we also have on-going Internet-based workshops. You can go through the introduction today, then sign up with the counsellor and start next week. Would you like to have a look?*

But would such a workshop be used and evaluated as beneficial by student clients?

It seems likely that in addition to the current need for more flexible service delivery for on campus and special needs students, as the online course offerings of universities expand, the demand for online student support will increase. Could we offer such services effectively online?

Study Purpose

The purpose of this project then was to develop and pilot-test an online version of a student counselling workshop for a common student problem: mathematics anxiety, here broadly defined as difficulty coping in math learning situations. In particular, the study was intended to meet the following objectives:

- to develop an online version of a mathematics anxiety workshop;
- to examine student use of the workshop and specific workshop features (self-assessment instruments, access to the counsellor through electronic messaging, bulletin board showing others' responses to discussion questions, within-session and homework exercises);

- to collect and analyze student reactions to the online workshop (evaluate ease-of-use, enjoyment) and evidence regarding its effectiveness (helpfulness, promotion of change);
- and to explore user preferences and suggestions re: specific design features within the workshop (instructional options: use of audio, video, text, interactive exercises; and communication options: modes of access to counsellor and other workshop participants).

The research and practice context for this project and research study will be discussed in Chapter 2, followed by a presentation of the methods used for the development and evaluation of the online workshop in Chapter 3. Chapters 4 and 5 will present the results and analysis of the evaluation study along with a discussion of the implications of the findings for the further development and practice of online student support intervention.

CHAPTER II

LITERATURE REVIEW

In order to provide an overview of the technological and research context for the current project, in this chapter, first the origins and development of computer use for counselling and psychotherapy will be briefly reviewed, followed by a discussion of the growing phenomenon of online psychological and support services¹. Second, current opinion and findings regarding the use and effectiveness of these and related online service efforts will be described along with available information regarding user satisfaction. Finally, in order to provide a background for the counselling issue addressed in the online workshop and outcome evaluations from the study, previous research regarding the problem of mathematics anxiety and common treatment interventions for math anxious post-secondary students will be presented.

Computer-Assisted Counselling

"Harnessing this technology for human development remains a challenge." (Reardon et al., 1984)

Scope and Development

A historical view of the gradual infusion of advanced technology into psychology and the helping professions reveals an ongoing pattern of tension between enthusiasm for potential usefulness and concern over potential misuse. Pioneering theorists and practitioners have been encouraged in the use of technology by the thought of greater efficiency and improved delivery of services to more clients, for example through the application of telecommunications (e.g., Roach, Reardon, Alexander, & Cloudman, 1983), audiovisual media (e.g., Barón & Hutchinson, 1984) and developing computer technologies (e.g., Sampson, Kolodinsky & Greeno, 1997). However, according to Ibrahim (1985), the use of technology for psychological purposes has historically been "questionable," bringing to mind:

¹ This review has been updated since the completion of the online workshop development phase of this project. At the time of initial design and development (1997/8) much less had been reported in this area.

the misuse of psychological tests, ethical violations in the use of electroconvulsive therapy, ... psychologists and counselors on television and radio providing the "1-minute intervention" or advice, the use of videotapes and audiotapes without regard to client protection, and research on such data without consultation with the client (p. 134).

It is against this experiential backdrop that psychologists and counsellors have entered the computer age. In 1984, Ekstrom and Johnson, co-editors of a special issue on computers in counselling for the *Journal of Counseling and Development*, asserted: "Computers are a topic that counselors can no longer ignore" (p.132). Indeed, according to Ibrahim (1985), of the current advanced technologies used for counselling – computers, advanced telecommunications and interactive videodiscs – computers have had the major impact.

The emergence of less expensive, more powerful, and more "user friendly" computers within the information technology revolution has led to the expanding use of computer technology into psychological practice (Barak, 1999; Sampson & Pyle, 1983). Walz (1984) has suggested that computer applications and use may fall under two broad headings: 1) computer-managed counselling (CMC) which "assists counselors with the clerical and administrative tasks associated with their work," such as record-keeping, scheduling, word processing, etc. and 2) computer-assisted counselling (CAC), an "interactive counseling technique in which the computer is used to present information, elicit and monitor responses, and select and present additional information in accordance with individual client needs" (p. 136). Reardon, Shahnasarian, Maddox and Sampson (1984) have also referred to CMC as "indirect use" applications and CAC as "direct use."

The greater employment of CAC in counselling, testing and guidance, came about as a result of the realization that computers could handle the repetitive or highly structured tasks such as information delivery and test administration more effectively than practitioners (Sampson & Pyle, 1983). Computer applications could offer increased objectivity (e.g., for educational decision-making), ready availability of information and the capacity to store and accurately deliver large amounts of information (e.g., for career information, testing and skill-building

exercises such as decision-making) (Walz, 1984). According to Sampson and Pyle (1983), by the 1980s, the most developed direct use of computers with clients was for career counselling. At that time, approximately 25 computer-assisted guidance systems were available to facilitate career decision-making. The most elaborate systems guided clients through assessing values, skills and interests, provided instruction in decision-making and provided career information.

Other areas of direct computer use with clients adopted in the 1980s were computer-assisted testing and assessment, computer-assisted academic counselling and computer-assisted personal counselling (Sampson & Pyle, 1983). Computer-assisted testing allowed administration, scoring and generalized interpretation of test results in one computer session. Computer-assisted academic counselling programs were used under the direction of a student support counsellor or learning skills instructor to assist clients in developing motivation and study skills and in gaining control over behaviors that hindered academic performance such as test anxiety and procrastination. A representative example is the CAI (computer-assisted instruction) study skills program developed by Gadzella (1982). This consisted of 13, 35-45 minute text-based linear modules designed to help students learn facts regarding effective study skills and how to develop them. Computer-assisted personal counselling systems were also available, mostly on an experimental basis as "self-help" software, to assist clients in resolving personal problems with or without a counsellor. According to Wagman (1984), the first of these were developed as experiments in artificial intelligence. The most famous is the DOCTOR simulated therapist application of the generic human conversation mimicking program ELIZA, created by computer scientist Joseph Weisenbaum in 1965. DOCTOR mimicked the reflection of feelings used in client-centered therapy by delivering a non-directive pre-programmed response that incorporates the client's previous typed statement (e.g., CLIENT: "I'm depressed." DOCTOR: I AM SORRY TO HEAR YOU ARE DEPRESSED).² Other personal counselling systems have been developed

² A demonstration version of ELIZA as DOCTOR is available at: <http://www-ai.ijs.si/eliza/eliza.html>

to simulate cognitive behavioral therapy for treatment of depression and cognitive problem-solving counselling for resolving personal dilemmas (Wagman, 1984). These systems such as Wagman's PLATO Dilemma Counseling System, generally instruct the client by explaining and teaching the steps of the therapy method to be used (e.g., dilemma resolution), reviewing and testing on this content (via multiple choice answers) then guiding the client to practice the steps (e.g., generating a variety of solutions) and to apply them to their own situation (e.g., evaluating solutions and selecting the best option).

Finally, in the later 1980s and through the 1990s, computer-assisted self-help software programs were developed to address the assessment and treatment of a wide variety of specific client issues (e.g., stress management, assertiveness training, self esteem, overcoming depression, dealing with suicide) and often featured computer-assisted instruction. Like the study skills program described above, CAI systems generally teach concepts and examples via tutorials, measure learning, present feedback and may include simulations to allow application of new skills to real life situations (Sampson & Krumboltz, 1991). In a more recent review of self-help software available for clinical psychology, Cutter (1996) concluded that "the evolution of psychological software is both fast and arcane." His search of the Social Science Software Information Bank (SIByl) [<http://www.gamma.rug.nl/sibyl.html>] yielded 82 items. Some representative items listed today include the Student Adaptation to College Questionnaire, SPIDER Phobia Control (user controlled presentation of images from a cartoon to a "big hairy spider"; for use with systematic desensitization therapy) and HELP – Esteem, "an interactive computer program designed to help people develop strong, realistic, positive self-images" [<http://www.gamma.rug.nl/iecsibfr.html>].

In their review of research efforts to assess computer-assisted psychotherapy, Wright and Wright (1997) concluded that "software developed for computer-assisted therapy generally has been well accepted by patients" and that "outcome studies have usually demonstrated treatment effectiveness for this form of therapy" (p. 315). Reviewers of computer-assisted systems for

counselling (e.g., Bloch & Kinnison, 1988; Cairo, 1983; Sampson & Krumboltz, 1991) have also reached the conclusion that although not all CAC software are "created equal," the well designed products are popular among users and generally lead to the acquisition of desired skills and attitudes, although the research base for these conclusions is sparse. Gadzella's CAI study skills program for example, was well received by students and led to improved scores on a survey of study skills and habits taken later in the semester. She concluded that "the CAI program can effectively present the information on effective study skills and how to develop such skills" (1982, p.122).

While there is consensus that in the foreseeable future computers are not likely going to be able to replace counsellors in the sense of being able to adequately "understand" client responses and reliably duplicate meaningful therapeutic dialogue (Sharf, 1985), some user reactions to these attempts have been surprising. For example, although the DOCTOR program has never been tested in a clinical setting, Weizenbaum (in Wagman, 1984), was "startled to see how quickly and how very deeply people conversing with DOCTOR became emotionally involved with the computer and how unequivocally they anthropomorphized it" as they did not want him to be able to see their conversations (p. 173). Walz (1984) has similarly noted that "many who have experienced computer-assisted counseling feel that it was an extremely "personal" experience because the interaction with the computer was so focused on them" (p. 136). He and others (e.g., Haring-Midore, 1984) note however, that client reactions should not be assumed to be universally positive as women, minority group members and learning disabled students in particular may be fearful or less interested in using computers. Walz (1984) concludes that "it is a major responsibility of counselors to repond to initial attitudinal and experiential differences and to ensure that they do not keep certain individuals or groups from profiting from the counseling process" (p.137).

Despite the increased availability and apparent effectiveness of a variety of computer applications for psychological use, their implementation in counselling practice has been slow.

Sampson and Krumboltz (1991) contend that while career counselling systems have received much attention in research and practice, the lack of attention in the counselling literature to CAI for other issues reflects the actual underutilization of CAI applications by practitioners. In his review of self-help software for psychotherapy, Cutter (1996) also concluded: "There continues to be a lag in mental health professionals adopting the available programs for office practice, even though this represents the safest approach to the use of computers with clients." Several authors have suggested that many issues have hampered the implementation of idealized concepts of technology use for counselling. These include: theoretical conflicts, acquisition of hardware and software, technology maintenance (Gati, 1994); and resistance to change by counsellors due to fear of the unknown or view of technology as dehumanizing and limited, lack of counsellor training, interest, and awareness, and cost of implementation (Bluhm & Kishner, 1988; Stevens & Lundberg, 1998; Walz, 1984). As greater efforts are made to encourage further research and implementation of computer applications however, due to a recognition of the potential negative consequences of using computer technology in counselling (e.g., misuse or excessive dependence on computer applications, restriction of the counselling process), reviewers of this practice have stressed the importance of monitoring professional practice in this area. According to Sampson (1986), counselling psychologists need to "assume full responsibility for directing this powerful technological resource" so that the positive rather than negative potential of computer use in counselling may be realized (p. 579). With the latest technological advance – the advent of the Internet – these responsibilities seem to be weighing even more heavily today.

The New Wave: Online Counselling and Support

"Take Two Valium and E-mail Me in the Morning" ?

Enter the Internet. Ever since the creation of the National Science Foundation Network in 1986 and the subsequent "coming online" of university staff and students to the network of computers used by the military, awareness and use of this massive information and

communication system has exploded (Brown, 1995). In 1980 there were 200 computers on the Internet (Brown, 1995); by the Spring of 1998, according to a demographic study conducted by CommerceNet/Nielsen Media Research³, the number of world-wide total users accessing the Internet for business, education and play was 171.25 million, with 79 million in the US and Canada alone. Advances in online technologies today have led to increased capabilities for the direct provision of services such as online banking and instruction to this multitude of users. Although professionals in psychology and the related helping professions joined this trend only "modestly" in the later 1980s, using the Internet primarily for e-mail communication among themselves (Barak, 1999), with increased provision of psychological information and services via the WWW, they are creating "a big presence" in this new territory (Sleek, 1995).

What's out there. In a recent review, Barak (1999) has identified ten types of psychological applications currently in use on the Internet: "information resources on psychological concepts and issues; self-help guides; psychological testing and assessment; help in deciding to undergo therapy; information about specific psychological services; single-session psychological advice through e-mail or e-bulletin boards; ongoing personal counseling and therapy through e-mail; real-time counseling through chat, web telephony, and videoconferencing; synchronous and asynchronous support groups, discussion groups, and group counseling; and psychological and social research" (p. 231). More generally, these applications may be seen as encompassing the areas of psychological information, assessment, support/discussion and counselling.

Today professional and lay Internet users can access a wide variety of mental health and self-help information via individual web pages, websites devoted to specific topics and psychological information banks. Referring to the proliferation of individual information sources, Weil (1996) offered this example: "there are enough self-help articles and Home Pages on the World Wide Web on how to combat loneliness to fill a dozen magazines" [<http://www.csudh>.

³ <http://www.commerce.net/research/stats/stats.html>

edu/psych/article.htm]. Information regarding community and online mental health services and products as well as e-mail contact addresses for further details are also available online. Cutter (1996) for example, found downloadable self-help software available at several mental health webpages. While there are some very comprehensive mental health-related websites (e.g., *tAPir*: The Anxiety and Panic Internet Resource at: <http://www.algy.com/anxiety/index.shtml>), information banks such as Mental Health Net [<http://mentalhelp.net>] offer the most centralized collection of information for a wide variety of disorders and include text, graphics, photographs, statistical tables, and in some cases multimedia support such as audio and video clips or slide shows along with indexed hyperlinks to further resources (Barak, 1999). The Mental Health Net page for the topic Anxiety/Panic for example, gives a general overview of the disorder, a link to a "Well-Connected Guide" offering detailed information from symptoms to treatments, and more links under the headings: *symptoms, treatment, online resources, organizations, online support* and *research*. In his review of self-help guides on the Internet, Barak (1999) found that in addition to information regarding the issue of interest and directions for change, many offer an assessment tool and a goal-oriented change plan with online instructions for individual use as the "sole guidance resource." An example is the YouthWorks Society's *CareerQuest* career exploration "path" at: <http://www.youthworks.ca>. A CD-ROM version is also available for purchase from the site.

In addition to abundant psycho-educational information and interactive self-help guidance materials, Internet users can also access many psychological tests and questionnaires intended primarily to be used for self-assessment (e.g., *Do You Have Math Anxiety? – A Questionnaire* at: [<http://www.bsu.edu/students/cpsc/anxiety.htm>]). Barak (1999) found that these resources vary in accuracy and completeness from test sample items or adaptations of original tests (i.e., abbreviated or reworded versions) to complete electronic versions of previously published paper-and-pencil tests or new original scales created for use at a website. The amount of accompanying information regarding background and use, scoring and results interpretation

for these tools also varies from site to site as does the amount and type of "service" provided. In some cases, users may complete and submit the test form directly from the webpage for immediate results, occasionally for a fee but often at no charge (e.g., *The Kiersey Temperament Sorter* at: <http://www.keirsey.com/cgi-bin/keirsey/newkts.cgi>, which purports to be equivalent to the well known and costly MBTI). For feedback on other tests, users are required to submit or copy and e-mail the completed form to later receive e-mailed results (e.g., *The Self Evaluation Scale – Do You Need Therapy?* at: <http://www.1-800-therapist.com/ses.html>).

Beyond accessing self-help information and assessments, as the Internet allows many options for group communication, users may "converse" via text with others who share the same concerns or may opt to just "lurk" – "listen in" on the discussions of others without being noticed. Although most support groups are asynchronous (i.e., based on exchanges of e-mails or similar "not in real time" exchanges), synchronous or "same time" groups exist as well through Internet Relay Chat (IRC). These opportunities are available either via numerous specific interest "newsgroups" (UseNet) accessible through a web browser (e.g., alt.support.anxiety-panic), e-mail based discussion forums handled by message distribution listservers (e.g., ANXIETY@home.ease.lsoft.com), online support forums (threaded discussion or bulletin board systems) such as MentalHealthNet's Anxiety Support Group [<http://forums.mentalhelp.net>] and "live" chat rooms (e.g., Healthy Place Anxiety-Panic Community at: <http://www.healthyplace.com/Communities/anxiety/site/index.htm>). The introduction given to new visitors at one anxiety-related chat site explains this option:

The #Anx/Pan channel on EFNET is devoted to giving support, providing information and a place to chat for people dealing with panic attacks, social phobias, generalized anxiety disorder, agoraphobia, ADD, depression etc. Anyone in need of support for any of these disorders and or people that are a support person are welcome. Our goal is to have a comfortable atmosphere where we can share ideas and offer each other support to get through each day.... This channel is made up of people dealing with the same disorders as you have and all are in different places in their mission of recovery. Stop by sometime, the anx/pan group usually gets going around 8:00 PM-EST each evening and we are there til... well we'll leave the light on for you!
[<http://www.mindspring.com/~lindelee/anxpan.htm>]

The growing phenomenon of "online self-help mutual aid groups" has been recently reviewed by King and Moreggi (1998) and Barak (1999) who found that numerous support groups have been formed for a variety of concerns including: medical issues (e.g., women with breast cancer), addictive behaviors (e.g., recovering addicts, eating disorders), coping with past trauma (e.g., sexual abuse survivors, bereaved parents and coping with death), parent support (e.g., single mothers with infants, parents of children with special needs) and psycho-educational needs (e.g., career indecision). Users in online forums and chat rooms may often opt to have their messages appear under a pseudonym or nickname and must log in to participate in the group. As many of these groups are not facilitated or monitored by a helping professional, users generally access them for emotional support, advice, information and sharing of resources with others.

Finally, Internet users may receive various forms of "professional" counselling via the Internet. These services range from free single session (Q & A) web advice to ongoing counselling for a fee, either alone or as part of a group, and via e-mail or "live" (synchronous) technologies. Recent reviews of these services (e.g., Barak, 1999; Powell, 1998) indicate that they are currently being provided by a range of practitioners (e.g., lay, credentialled or licenced, psychologists, psychiatrists, counsellors, social workers). The Samaritans [<http://mentalhelp.net/samaritans/home2.htm>], for example, provide a free e-mail service for suicidal individuals to receive help from "listening volunteers" trained in telephone crisis line intervention. According to Barak (1999), many websites offer free or small fee e-mail advice for specific issues (e.g., sleep disorders), which may be posted on a bulletin board for other site visitors to read or e-mailed to the enquirer. Currently, however, there are no reliable statistics regarding the use of Web advice or single-session counselling opportunities (Barak, 1999).

More information has been collected regarding ongoing counselling services provided on the Internet. According to Martha Ainsworth (1999), who has been tracking online therapy since 1996, as of May 1999, there are over 160 websites where more than 300 therapists offer online interactive psychological services. Her website, "ABCs of Internet Therapy" [[http:// www.](http://www.)

Metanoia.org/imhs] provides a consumer-compiled "comprehensive, independent consumer guide to the psychotherapists and counselors who provide services over the Internet." Powell (1998) used the list of practitioners from Ainsworth's site in 1997 to conduct a survey of these online services. She concluded that online mental health service providers are likely to be male "seasoned professionals," often attached to colleges and universities with an average age of 48 years, 15 years of clinical practice experience and approximately 2 years of online practice. They provide either single interactions on a general or specific topic or ongoing interactions mostly via e-mail, occasionally via text-based online chat and rarely via videoconferencing or web telephony (live audio chat via the Internet using a microphone and speakers). The typical online client is just as likely to be male as female, wants assistance with relationship problems and is likely to be experiencing depression. According to Grohol (1999), clients may use "e-therapy" as an adjunct to other types of real-world services, to help clarify issues they are currently working on or to check in with an objective third party.

King & Moreggi (1998), in their review of Internet therapy and self help groups, concluded that although facilitated (i.e., therapist-led) group therapy online is very rare at this time, "it is potentially one of the most important aspects of online therapy, in terms of the therapeutic value to clients" (p.97). Two recent "trial efforts" involving moderated group counselling as part of a larger online group intervention have been the Comprehensive Health Enhancement Support Program (CHESS) reported by Gustafson et al. (1994, in King & Moreggi, 1998) and the Career HOPES intervention reported by Herman (1997). The CHESS intervention for individuals with potentially terminal illnesses (breast cancer/AIDS) offered online psychoeducational information, a closed online support group and e-mail access to medical specialists. Herman's Career HOPES (High-tech Online PsychoEducation and Support) program for career undecided individuals recruited online, similarly offered online psychoeducational information (four weekly interactive lessons in career exploration) along with a closed and professionally moderated online support group. From their review of these efforts, King &

Moreggi (1998) concluded that the further development and research of online support groups will add another modality to group therapy intervention.

Online student counselling information and services. Since Brown's (1995) earlier survey of college health information systems indicated that there was little use of the Internet by college and university counselling centers, although the research reports and surveys of online service are sparse in this area, there is growing evidence that student counselling and support practitioners are beginning to make greater use of some of the applications discussed above. Student counselling centers for example, seem to have seized the opportunity to advertise their location, contact information and details regarding specific on-campus counselling services, staff and policies via web pages (e.g., The Student Development Centre of The University of Western Ontario, at: <http://www.sdc.uwo.ca>). A complete searchable directory of these web pages (Student Counseling Centers on the Internet: <http://ub-counseling.buffalo.edu/centers.html>) has been created by David Gillies-Thomas to promote the ongoing sharing of counselling center information and new online efforts. Many of these pages also offer either links to useful Internet resources for students or to their own free information pages on topics of student interest. As indicated in Chapter 1, "virtual pamphlets" from these pages are now indexed and linked for a growing number of topics in the "Student Counseling Virtual Pamphlet Collection" located on the University of Chicago Student Counseling and Resource Service pages [<http://uhs.bsd.uchicago.edu/scrs/vpc/vpc.html>]. This service has also recently expanded to include the Student Counseling Virtual Book Collection.

Some experiments with more interactive online help are also beginning to be delivered through these sites. For example, an Internet-based interactive program that delivers "Help Screens" on a variety of student counselling topics (e.g., test anxiety) has been developed by Carlos Zalaquett at Sam Houston State University (see: <http://www.shsu.edu/~counsel/welcome.html>). An even more advanced example is the growing collection of student health modules: The Healthy Student Software Collection [<http://www.ualberta.ca/HEALTHINFO>].

These fully interactive free programs containing information and self-assessments on various health topics (e.g., "Students and Stress," "Books and Booze") are available for download but are not currently used directly via the Internet.

While most student counselling center web pages offer a contact e-mail address for further information regarding services, none at this time seem to encourage contacting staff to address counselling concerns via e-mail. One notable exception is the student service e-mail contact encouraged by online institutions for academic counselling and "course advice" (e.g., see the course managers information at OnlineLearning.net: <http://onlinelearning.net/Studentservices>). The most direct use of e-mail for student emotional support currently found was the "RELATE: Relationship Exploration Learning & Awareness Through Email" anonymous electronic forum for University of Chicago students. This is an example of a monitored but unmoderated "online self-help mutual aid group" developed for student use. A similar monitored but not professionally moderated online group for college freshmen with eating disorders has been reported by Winzelberg (1997) who has also experimented with variations of this format (see below). Columbia University's "Go Ask Alice" [<http://www.goaskalice.columbia.edu/index.html>], electronic advice forum and searchable Q & A archive also allows students to use e-mail for help with brief questions related to their physical, sexual, emotional, and spiritual health, although only a limited number of questions are selected for weekly Q & A postings.

In sum, while great strides are being made in the use of the Internet for student support information dissemination, student counselling and support personnel are only beginning to experiment with the more interactive psychological application potential available via the Internet. In particular, currently operational examples of moderated online student support groups or more comprehensive interventions similar to Herman's (1997) HOPES model have not been found either online or in the research literature.

Reactions to Cyberservices

As psychological and student support personnel consider the possibility of entering further into the new realm of online psychological services, the experiences of pioneering service providers and users, as well as concerns raised by interested observers, can help to inform best "next steps."

Reactions from Helping Professionals

A paradigm shift?

The increasing provision of mental health services via the Internet has spurred on an intense and well-publicized debate among professionals at conferences and on discussion lists. The practice of "online therapy" or WebCounseling in particular has led many to voice "highly polarized" reactions: promise or pariah? (Powell, 1998). Referring to this debate, counselling professor, Dale Pietrzak has noted:

much of the discussion I have read about the issue has sounded much more (in tone) like the discussion analytical therapists had when other professionals suggested clients do not need to lie on a couch three times a week for one to two hours to receive care....the powerful emotional issues this raises for counselor educators suggests to me that perhaps this issue may become one of the shifts in paradigms we experience in our profession (in Morrissey, 1997: <http://www.counseling.org/ctonline/archives/ct1197/webcounseling.htm>)

Potential. Many potential and current advantages of being able to offer and receive online services have been enumerated by professionals who are proponents of Internet use. First, cost and convenience of delivering services are a major benefit due to the availability of inexpensive and relatively easy to use computer networks (Sampson, Kolodinsky & Greeno, 1997). Career counsellors Stevens & Lundberg (1998) contend that for information dissemination purposes, the emerging online technologies make wide broadcasting of information via radio and television seem "ineffective" by comparison. This superiority is due to the "pointcast" nature of information delivery offered via the Internet that allows users the control to "point" to the information they desire rather than have their needs anticipated by the provider. As well, the fact that multiple users can access the online information at once and the

relative speed of the information delivery further enhance its effectiveness. Barak (1999) has also noted that online self-help guides offer a convenient, no cost and discreet means of accessing help for sensitive issues and that due to the richness of available career-related and educational information, the Internet has become a profoundly useful aid to career counselors and educators. Similarly, in addition to lower costs, testing online allows some unique advantages such as the ability to use three-dimensional representations for spatial ability and body image assessments (Barak, 1999).

Cost is also a benefit when considering online counselling. According to Sleek (1995), office visits with mental health professionals can cost clients up to \$140 while fees for Internet providers average \$20 per inquiry. Fee information for some services listed on Ainsworth's ABC's of Internet Therapy site [<http://www.metanoia.org/imhs>] also included \$65 for a 50 minute private chat session and \$20 for a group chat session. These lower costs may allow access to users who otherwise would not be able to pay for psychological services. When asked about perceived advantages in Powell's (1998) online practitioner survey, respondents listed "the ability to provide services to disabled clients and those living in remote areas" and "the increased flexibility of service delivery" (more often and not constrained by time, weather or illness) as two of the strongest. Additional advantages noted for clients included "decreased defensiveness," "opportunity to obtain information and validation from many," "increased use of journaling" and "reduces risks when seeking information about 'embarrassing' issues" (p. 6). Psychologist and former "Shrink-Link" advice columnist Dorothy Litwin, has also stated that while her brief intervention is "definitely not a substitute for face-to-face psychotherapy... in some cases it's terrific when people don't have access to a professional person, like in rural areas" (in Sleek, 1995). Other benefits potentially offered by the practice of e-counselling include: opportunity for clients to access individuals with special expertise (e.g., police stress, eating disorders); to continue receiving counselling support when on frequent business trips or when pressed for time; and to "try out" counselling discreetly without the apprehension of going to a counsellor's office

(Sussman, 1998). Finally, according to online counselling expert John Grohol (1999), "e-therapy allows both the client and the professional to fully reflect on issues discussed in a previous correspondence... e-therapy's strength is in the ability to explore and flesh-out a person's concerns without awkwardness or the need to 'think on one's feet'" [<http://psychcentral.com/best/best3.htm>].

Similar benefits have also been listed for online group counselling services. According to Phillips (1996), who conducted a participant observation study of online self-help groups (SHGs) for adult children of alcoholics, for many individuals, going to the first meeting can be very challenging. From her experiences she concluded:

I believe attending meetings online can be a very good first step for those individuals who have reservations and/or anxiety over attending a SHG meeting. Meeting online can allow a person to get comfortable with the basic format of the meeting, help them to ease into the recovery process, and reach individuals that would normally not attend a meeting because of their anxiety (p. 3).

Self-help forums may also be particularly useful for those who are normally isolated from peers for example due to geographical location, mobility-restricting disabilities, emotional difficulties, hospitalization or lack of transportation (Sussman, 1998). Further, the global nature of the Internet and recent proliferation of self-help groups has permitted connection and support among individuals who may have difficulty finding similar others in their own communities (e.g., those with rare disorders, parents of children with specific conditions). According to Madara (1997 in Barak, 1999), some online self-help groups currently exist (e.g., victims of stalkers) that have no face-to-face counterpart.

Concerns. Among those helping professionals who have been highly critical and resistant to the proliferation of online mental health services, many concerns have been raised. Regarding use of the Internet by clients for mental health-related information for example, Barak (1999) notes as common concerns: "Web-information resources are a source not only for valuable information, but for mistaken, biased, distorted, old, inciting, or fake information, too.... This situation may be especially problematic with young or naive users, who are likely to be less

selective about information content." This problem has also been noted by Stevens and Lundberg (1998) in considering client use of online career information. As the Internet allows individuals to "publish" material, often the information received is not professionally screened for appropriateness and accuracy and can be overwhelming. Very similar concerns have also been raised regarding the use of online tests and scales. Many are non-professional, do not conform to accepted standards for testing, do not provide background regarding who should take the test or access control, and importantly, do not provide monitoring and support to ensure that the test taker has accurately understood instructions and has not been emotionally impacted by the results (e.g., in receiving negative personal information or low scores) (Barak, 1999).

The numerous concerns of opponents of online counselling and therapy as well as those calling for regulation of these practices have frequently been articulated in professional publications and the popular press. The major issues have been that because online therapeutic interactions are for the most part unregulated and their efficacy and effects on clients are at this point mostly unknown, they present a potential risk to the public and are therefore ethically unacceptable (e.g., Ainsworth, 1997; Morrissey, 1997; Sampson, Kolodinsky, & Greeno, 1998). Many reviewers of this literature have categorized the potential risks of online counselling under the headings of ethical/legal issues and relationship development issues. Some ethical concerns include protection of client confidentiality (need to protect sensitive electronic data from interception by others), provision for handling emergency situations (e.g., how to adequately support an individual in crisis while working with them remotely), protection of clients from unlicensed/inadequately credentialed practitioners, protection of clients from counsellor misinterpretations caused by geographic/cultural distance and protection of clients' rights to access services (Sampson, Kolodinsky, & Greeno, 1998). Regarding this last point, many practitioners are concerned about the possibility of replacing face-to-face services and therefore restricting individuals with typically limited computer access (the poor, children, elderly, and

disabled on the 'have not' side of the "Digital Divide") (Lebow, 1998 in Lazlo, Esterman, & Zabko, 1999).

Under the category of relationship development issues, concerns generally center around the text-based nature of the counsellor-client interactions and the counsellor's ability to develop and maintain a therapeutic relationship under this condition. With loss of the nonverbal communication cues and constant feedback of live interactions, the potential for misunderstandings, and possible client premature termination when confronted with difficult issues, is heightened. Ainsworth (1997) has therefore suggested that an important issue for consumers is terminology (i.e., Is this therapy or advice-giving?). According to Grohol (1999):

E-therapy is not psychotherapy, nor is it psychological counseling. Since it does not presume to diagnose or treat mental or medical disorders, and because it does not limit who may be appropriate to provide e-therapy services, it would be inappropriate to compare it to traditional face-to-face psychotherapy, assessment, or counseling services. Like other types of therapy (occupational therapy, bibliotherapy, physical therapy), e-therapy helps a person address issues of concern to them in their lives under the guidance of a professional. E-therapy is similar to the idea of "coaching," helping a person address specific concerns with specific skills [<http://psychcentral.com/best/best3.htm>].

Internet therapy reviewers King and Moreggi (1998) agree:

Email and chat room therapy is NOT therapy, it is virtual therapy. This point is must be made clear to online therapy providers and the general public. The text-based nature of the communications, devoid of sensual clues, has distinct advantages and disadvantages. If the practitioner is not intimately familiar with the nuances of text based relationships, the potential to do more harm than good exists (p. 105).

Finally, regarding the promotion of unmoderated online support groups, there is some concern that such groups may support sharing of false information or poor advice (Cutter, 1996) and problematic or mistaken belief systems (i.e., it's "genetic") that lead to feelings of helplessness by group members, and that members may defer seeking professional help. An additional interesting aspect of online communication that affects both group and individual interventions is the fact that online users may be anonymous and hide their true identity from others (e.g., may lie about their age or gender in order to receive counselling or join a group). For

these reasons, Lebow (1998, in Lazlo et al., 1999) suggested that the Internet is more appropriately used for psychoeducational purposes as an adjunct to face-to-face therapy.

The current status of the ongoing Internet therapy debate seems to be both a tendency toward compromise through standards setting, and conservative use until more research data is accumulated. Should Web counselling be allowed? Many say the point is now moot. Childress (1998) and Sussman (1998) for example, have suggested that a code of ethics for online practices and future certification guidelines will be needed to protect the public while continuing to preserve individual choice. Several professional associations (e.g., Internet Society for Mental Health Online, National Board for Certified Counselors, American Association for Counseling and Development, American Psychological Association), in recognition of growing Internet information and service delivery by professionals, have developed new standards for Internet counselling, often as an extension of their current guidelines for distance and media counselling. Although Childress (1998) has warned against adopting an overly conservative approach and thereby compromising the ethical standard of access to treatment for all, it is interesting to note that some of the earliest pioneers in this area have decided to take down their cyber shingles. David Sommers' Mental Health Cyber Clinic [<http://nicom.com/~davids/pageone.htm>], noted as a field leader in Cutter's (1996) review for example, no longer offers "opportunities for ongoing helping dialogue using e-mail" but now shows instead:

This site is closed insofar as offering any sort of online consultation via email. Problems and concerns around issues of ethics, fees, confidentiality and legalities need to be resolved before going forward with this work. Feel free to enter and look around for historical interest only. – (Sommers "Mental Health Cyber Clinic" started November, 1995.)

Efficacy Evidence and Reactions from Users

Efficacy. The current state of knowledge in terms of psychological applications on the Internet has recently been summarized by Barak (1999). He states that as this field is relatively young:

it is premature to make generalizations concerning impact, utility, importance, effects, costs, applicability, and the like. Issues that were voiced several years ago... still remain highly controversial, such the ability to offer e-mail-based therapy. Although empirical research has consistently been advocated, actual research—especially studies with strict methodologies—is only just beginning. It seems that the psychology discipline is at the stage of observing developments in the field and communicating some general messages that mainly have to do with precautions and recommendations [<http://construct.haifa.ac.il/~azy/app-r.htm>].

Laszlo, Esterman, & Zabko (1999), in their review of "therapy" over the Internet agree:

While speculation and strong feelings are plentiful, research related to the effectiveness of and methods used in online counseling is sparse, reflecting both the newness of the field and also the difficulty in monitoring and measuring transactions in cyberspace. The research that exists tends to be descriptive, one-shot efforts based on extremely small samples [<http://www.geocities.com/HotSprings/Resort/7579/internet.htm>].

With this limitation in mind, some of the studies that may be informative for the current project can be considered. Interest and benefit from accessing online student support information for example, has recently been studied by Zalaquett and Sullivan (1998) using Zalaquett's interactive Counseling Center Help Screens program. They reported that 4,205 contacts were recorded over the program's three years of operation. Online user evaluations from approximately 15% of these contacts (students and counsellors) indicated that the Internet-based delivery was "helpful" and "easy to use" and would be recommended to others. Although direct evaluations of Hsiung's (1997) Virtual Pamphlet Collection have not been collected, he concluded from tracking contacts and contributions from counsellors at other institutions, that "this innovative resource is considered valuable" (p. 154). Site use statistics provided at Columbia University's Go Ask Alice! web site indicate that these pages are accessed more than 2.5 million times a month by readers in over 60 countries. As Alice is reported to have had "instant success" and now receives approximately 1,500 questions weekly from "college and high school students, parents, teachers, professionals, older adults, and others, on every conceivable health topic," this appears to be another very popular and useful resource [<http://www.goaskalice.columbia.edu/about.html>]. From these experiments in creating online information useful for counsellors and student clients,

it appears that interactive web-based information sources for common student needs can be of interest, instructive and used by these groups.

Of the minimal research evidence to date regarding the efficacy of online interventions, the most seems to have been collected through online groups. According to King and Moreggi (1998), studies of unmoderated online groups organized for peer support (e.g., breast cancer sufferers) have revealed that people communicate in them in ways that are characteristic of face-to-face communications (high levels of support, acceptance, and positive feelings). Barak (1999) also feels that these studies indicate general effectiveness for providing peer support: "Despite the remote, technical nature of computers and the fact that online communication commonly operates among people who have never met in person, people who participate in online group interactions can develop a sense of community and are able to offer a virtual shoulder." Jeannie Rust (1997), of Eating Disorder Recovery Online [<http://www.edrecovery.com>] for example, conducts 10-week online body image groups for binge eaters incorporating many of the same exercises and interventions used in the office, but has the participants do them at home and then "process" them as a group in a chat room. She has noted that the rapport established in a chat room is "quite something."

While this level of support has been achieved in some groups, further research suggests that many variables may affect the level of support achieved. For example, through a content analysis of messages posted to an unmoderated eating disorders forum for freshman students, Winzelberg (1997) found that the group members used the same peer assistance strategies as face-to-face support group members, although 12 % of the messages contained inaccurate or unhealthy information that would likely have been corrected in a live group. In another study of an eating disorders group (Winzelberg & Taylor, 1997), an intervention program of psychoeducational exercises ("Student Bodies") was used along with e-mail and a moderator who facilitated discussion (but did not do "group therapy"), provided information and directed participants' use of the program. For this group, the researchers found that the group members

disclosed concerns but the number of supportive messages between them was low. Weinberg, Uken, and Wessel (1995 in Lazlo et al., 1999) found that the intervention of a more active group leader was needed to encourage supportive interactions with a small (six member) online group for women with breast cancer. This finding supports the theory of Galinsky, Schopler and Abel (1997 in Lazlo et al., 1999) that due to the decrease in visual and auditory cues available, more frequent and longer-term intervention of a group leader may be essential to establish supportive communication patterns among group members in telephone and computer groups. Galinsky et al. (1997) also suggest that structured systems for tracking patterns of communication and assessing silence and anxiety can be helpful to ensure group support. Therefore, it seems that variables such as purpose of the group (e.g., primarily for psychoeducational "work" or support), size of the group, and the age and anxiety level of group members may affect the degree of supportive communication exchanged. The presence of an active moderator then seems to be most indicated for experimental groups. Interestingly, the fact that Jeannie Rust works with professional women either by telephone or online, also suggests the possibility that several additional variables may have an effect on the degree of supportive discussion in her close online groups: e.g., maturity/independence of group members, confidence with technology, moderator experienced with distance interventions, and the use of synchronous communication through chat.

In addition to the growing evidence that supportive relationships are possible through online groups, findings from the few studies and practice reports of groups that combine psychoeducational interventions with peer support also suggest that these interventions may be effective when delivered online. In Winzelberg and Taylor's (1997) Student Bodies study for example, they found that after completing the program, participants made significant progress in body image compared to controls who did not receive the intervention. Rust (1997) has also reported observations that her 10-week online body image discussion and intervention groups are "extremely effective." Other studies in this category are the Comprehensive Health Enhancement

Support Program (CHESS) and Career HOPES online interventions. The combination program of closed e-mail discussion groups and online psycho-educational material used in CHESS (Gustafson et al., 1994 in King & Moreggi, 1998) was found to be effective in improving reported quality of life and decreasing need for health care resources. The four-week Career HOPES interactive lessons and bulletin board discussion interventions were also reported to be successful: career-related gains (career decidedness, self-knowledge and career exploration behaviours) were reported for both moderated and non-moderated discussion groups with the moderated groups showing greater gains in the areas of satisfaction with future career prospects and frequency of career exploration behaviours (Herman, 1998).

The finding that these online interventions have the potential to be effective not only for offering support but also for achieving learning outcomes, is not surprising when taken in the context of a growing body of literature from researchers of distance and online learning. The general finding of "no significant difference" in learning between online and face-to-face delivery has been frequently reported in this literature (see "The No Significant Difference Phenomenon," Russell, 1999: <http://cuda.teleeducation.nb.ca/nosignificantdifference/index.cfm>). Similarly, the possibility of creating a highly supportive group through text-based communication and the need to take specific measures in order to facilitate discussion is also typically reported by online educators (e.g. Berge, 1995). As suggested in the discussion of more and less successful support groups above, what is missing from both the new online learning and online counselling areas of knowledge at the current testing stage is a more detailed understanding of how the many individual learner and group variables interact to affect outcomes in these online settings.

User satisfaction. A few studies have been conducted to document consumer satisfaction with online psychological help. Ainsworth (1999), for example, reported results from a survey of over 400 clients of online therapists: more than 90% responded that "working with a therapist on the Internet helped them" [<http://www.metanoia.org/imhs/alliance.htm>]. As the ongoing survey is

completed voluntarily by visitors to her website however, it is difficult to know whether this figure accurately reflects the current population of Internet counselling consumers. One person wrote about the experience:

I am fairly knowledgeable about psychotherapy (for a layperson), and was fortunate to work with a very talented psychotherapist for several years, experiencing the full depth and richness of that experience. I also had the experience of corresponding by e-mail with another psychotherapist over a period of about six months. You should know what happened: I experienced deep emotions while reading and writing – grief, anxiety, joy, love, rage, you name it – and explored some very deep issues. I learned to trust and depend on this person. The therapist was usually able to sense my feelings from changes in my writing. Transference happened. The relationship was reflected in my dreams. I was challenged, comforted, and empowered. The experience was profoundly healing, and my life changed for the better.

Ainsworth (1999) concluded from this reaction: "It is quite clear that it is possible to form deep and meaningful relationships even on the basis of text-based correspondence, and these relationships can be healing" [<http://www.metanoia.org/imhs/alliance.htm>]. An earlier survey of online therapy consumers was conducted by King in 1996 (in King & Moreggi, 1998). When asked, "Do you feel your online therapist truly cared about you?" he found that over 75% responded "yes." King also reported that nearly 70% felt the service was worth the cost and that the average therapist rating was 6 on a scale of 1 to 10, with 10 being the highest level of satisfaction. Commonly listed reasons for choosing online therapy included: convenience, comfort to say what they felt, ability to connect with people for someone new to the area and the writing format allowed them to take time and organize thoughts; negatives listed were: slow give and take and difficulty trusting without visuals. Interestingly, this list is very similar to lists of perceived benefits given by distance education students who prefer online instruction (Cravener & Michael, 1995).

Reports from the field of electronic health care may also be helpful in projecting possible client satisfaction with and use of developing online psychological services. In a comprehensive report of interactive health communication, Eng and Gustafson (1999) suggested that when patients have access to both online and face-to-face counselling, they prefer the online option.

They based this conclusion on the growing consumer use of and stated desire for online communication with health care professionals, as well as three specific studies: 1) in an unpublished study of recovering patients who had access to both online and outpatient substance abuse treatment, 30 percent presented for outpatient treatment and 87 percent accessed online treatment; 2) in a randomized study of postpartum mothers, they were eight times more likely to use electronic support groups than face-to-face groups; and 3) a study showed that women with breast cancer preferred online counselling and support groups to face-to-face interactions. One can imagine that for all of these patients, the convenience and anonymity of online service would make it an attractive option. Rice (1997) has also found considerable interest in the possibility of online counselling services among current Internet users: from 500 online responses to the question "Would you seek counselling online?" half of the respondents said "yes." On campus students however, may not yet be as enthused about the expansion of counselling services to the Internet. According to a recent and rare survey of student interest in online counselling service delivery, Ross (1999) found:

- a) The great majority of students still prefer to meet with a counselor or advisor on a face-to-face basis;
- b) Students who have taken, as one might expect, are more inclined to consider using on-line alternatives, such as: e-mail contact with an advisor, a web-based way of checking courses completed or graduation status, a web-based information site on career or school planning;
- c) The counseling and advising situations that are more concrete and information based (i.e., What classes do I need to take next term?) are the ones that lend themselves to internet applications;
- d) While the situations that involve more interactive personal planning (i.e., What is the best career choice for me?) will remain as those which a face-to-face contact is preferred (p.8).

Best Next Steps?

From this review it is clear that a wide variety of online psychological services are being developed in an effort to meet specific user needs. The Internet offers a particularly attractive potential for those in the helping professions to provide convenient, valuable services to individuals who would normally be reluctant or would have difficulty accessing them. In addition to more pioneering experiments in offering new online services, detailed evaluation research is

needed to assist service providers and clients in assessing the appropriateness of this unique delivery method in relation to individual characteristics and needs. In the meantime, what can student services personnel consider? While "therapy" online continues to raise thorny ethical issues, much of student counselling is psychoeducational and therefore appropriate at this time until further is known about the optimal practice and risks of therapy online. As the few efforts to offer online psychoeducational interventions undertaken to date have led to promising results and raised questions regarding variables that might affect the development of interpersonal support in online groups, further pioneering work in this area is justified. Stevens and Lundberg (1998) support this conclusion: "The potential for information dissemination and retrieval is easy to understand, and to date, has been the most common use of this technology. It is important, however, that counselors focus on the interactive potential of the Internet in a creative manner" (p. 206). The most common recommendation from the field and governing associations is that if one chooses to proceed, they should do so with caution, consulting appropriate ethics guidelines and current research in order to "do no harm." One of the most consistently stated precautions from experts in this area is to ensure responsible counsellor involvement at all stages of the intervention (e.g., Childress & Asamen, 1998; King & Moreggi, 1998; Sampson et al., 1998; Stevens & Lundberg, 1998).

Tackling Mathematics Anxiety at the Post-Secondary Level

"Math class is tough!" (Talking Barbie, 1992)

The construct of "mathematics anxiety" has received attention over the past several decades in both professional education journals and the popular press as a possible explanation for poor math performance, avoidance of math courses in high school and beyond and observed math-related sex differences. As a result of her findings in 1973 that 92 percent of the women in the first-year class at Berkeley lacked the highschool mathematics to take calculus or intermediate Statistics – courses required for all but five of the twenty majors at the time – feminist sociologist Lucy Sells called mathematics a "crucial filter" for the majority of

professions (Tobias, 1976). Since then, interest in researching the nature and causes of math anxiety and designing treatment interventions to alleviate the problem has continued, spurred on by a recognition of the importance of science and technology in careers of the future and concern over continuing underrepresentation of women and minority students in these areas (e.g., Hadfield, Martin, & Wooden, 1992). Student services professionals and math educators have also continued to report their struggles with this issue on college and university campuses. A summary of the major research findings and treatment efforts is presented below.

Current Knowledge

Now known as one of several specific academic "anxieties," mathematics anxiety was first reported by Dreger and Aiken (1956, in Rounds & Hendel, 1980) as "number anxiety" and defined as the "presence of a syndrome of emotional reactions to arithmetic and mathematics" (p. 139). Over the years, this construct has been defined in a variety of ways from a debilitating "I can't" syndrome often associated with panic, helplessness, paralysis and mental disorganization (Tobias, 1976) to merely a lack of confidence in one's ability to learn mathematics (Reyes, 1984). Most often assessed through self-report instruments such as the widely used Mathematics Anxiety Rating Scale (MARS) (Richardson & Suinn, 1972), reviewers agree that although empirical studies are sparse, particularly regarding incidence, math anxiety research results across studies are difficult to compare because varied terms, meanings and measures are used (Williams, 1988; Wood, 1988; Stodolsky, 1985). With this limitation in mind, some generalizations from the literature can be made.

While prevalence estimates have been very difficult to make again due to a lack of uniformity in measurement, Stodolsky (1985) suggests it is clear that many adults, some who may be classified as phobic, "feel incompetent mathematically and dread the idea of mathematics courses or chores" (p. 126). From her early study of the prevalence of math anxiety at the post-secondary level, Betz (1978) reported that 68 percent of the students enrolled in college math classes experienced high levels of mathematics anxiety. She concluded that there was a "great"

need for math anxiety reduction programs at the post-secondary level. More recent findings have been reported by Probert & Vernon (1997) who discovered from their 1992 University of Florida Counseling Center Needs Assessment Survey that one in four of the students sampled, or 9,093 students, indicated "a moderate to high need for help in coping with their anxiety about math." Reported results from several comparative studies using the MARS with college students have consistently suggested that relative to other college majors, the highest levels of mathematics anxiety may be found among elementary education majors (Betz, 1978; Fennema & Sherman, 1976; Kelly & Tomhave, 1985; Rounds & Hendel, 1980; Sovchik, Meconi & Steiner, 1981), a group that is often well-represented in mathematics anxiety treatment groups. Some evidence also suggests that many of these individuals continue to feel math-anxious when anticipating teaching mathematics as preservice teachers and even as experienced, practicing teachers. In a review of this literature, Wood (1988) for example concluded, despite the fact that research does not support the hypothesis that *most* elementary teachers hate or fear mathematics, it does support the contention that a *significant minority* feels this way. Math educators Bulmahn and Young (1982) are particularly concerned that mathematics anxiety may be a "communicable disease" that is being carried by elementary teachers to generations of the student population or at least that teacher math anxiety may affect the quality of mathematics instruction such as the amount of instructional time spent on mathematics.

In attempts to discover the nature of mathematics anxiety, several factor-analytic studies of the MARS have found that whatever it measures is a two-dimensional construct: in every case, the notions of numerical functioning (fear of actually doing math) and mathematics evaluation (writing math tests or taking math courses) were identified (e.g., Frary & Ling, 1983; Rounds & Hendel, 1980). According to Hadfield and Maddux (1988), mathematics anxiety is distinguishable from general test anxiety and mathematics test anxiety in that it occurs under many varied conditions other than testing situations. Richardson and Woolfolk (1980) similarly suggest that math anxiety is best considered a general dread of mathematics and of tests in

particular. Ferguson (1986) has also suggested that a third factor, "abstraction anxiety" is useful to identify the specific fears related to higher math topics such as algebra and geometry. The few qualitative studies of the nature of math anxiety (e.g., Byrd, 1982, reported in Reyes, 1984), suggest that it is manifested in many ways and that in nearly all cases is viewed as debilitating. This result was also found in my previous phenomenological study (Buchanan, 1994) designed to gain a more complete understanding of the phenomenon of mathematics anxiety. Math anxious participant recollections yielded the following summative description of the debilitating effects of this issue for students:

The experience of dealing with academic math is like facing a dragon that keeps rearing its ugly head: feeling very personally threatened by potential failure and struggling to understand, yet being unarmed, defenseless and vulnerable against it. The body is experienced as tensed with accompanying emotions of stress, anxiety and frustration which vary in intensity with the degree of perceived threat. Actions taken are to seek help to understand under safer conditions or to avoid the confrontation. A constant part of the environment, the need to pursue math pulls in one direction while the need to avoid discomfort pulls the other way producing an on-going dilemma – more or less salient depending on current life circumstances (p. 23).

Mathematics anxiety has been found to have many varied correlates. Based on a meta-analysis of the results of 151 math anxiety studies, Hembree (1990) reported that a) mathematics anxiety is related to *poor performance* on mathematics aptitude/achievement tests with low-anxious students consistently scoring better (mean effect size = - 0.61), b) math anxiety is inversely related to *positive attitudes* toward mathematics with strong inverse relations observed for *enjoyment* of mathematics ($r = - 0.75$ Grade 5-12, - 0.47 College) and *self-confidence* in math ($r = - 0.82$, - 0.65) and c) math anxiety is bound directly to *avoidance* of the subject – high anxious students took fewer high school math courses and showed less intention in high school and college to take more mathematics. Variables for which differential mathematics anxiety levels have been found include: *ability* (higher mathematics anxiety was slightly related to lower IQ levels whereas its relationship with verbal ability was so low that it was not of practical importance); *school grade level/age* with anxiety levels increasing to Grades 9-10 then leveling

off; *undergraduate fields of study*, with high levels of math anxiety in remedial mathematics and declining with more advanced study (math and science majors lowest, preservice teachers highest); *ethnicity* (Hispanic group more anxious than blacks and whites); and *gender* with females consistently reporting higher math anxiety levels than males, especially in college. Correlations reported in other single studies have suggested that math anxiety may be related to a field-dependent cognitive style (Hadfield & Maddux, 1988), low persistence orientation among Native American students (Hadfield, Martin, & Wooden, 1992), a strong "Feeling" personality type on the Myers-Briggs Type Indicator among preservice teachers (Hadfield & McNeil, 1994) and age, with mature returning students more likely to have mathematics anxiety (Hadfield & McNeil, 1994).

Although Richardson and Suinn (1972) contended that "mathematics anxiety exists among many individuals who do not ordinarily suffer from any other tensions" (p. 551), in Hembree's (1990) meta-analysis, direct relationships with math anxiety were also found for "*a general anxiety proneness*" ($r = .35$) (p. 39). Mathematics anxiety also related directly to debilitating test anxiety ($r = .52$) and inversely to "*the anxiety drive that facilitates performance during testing*" (p. 40). Hembree concluded from this moderate mean correlation: "it seems unlikely that mathematics anxiety is purely restricted to testing. Rather the construct appears to comprise a general fear of contact with mathematics, including classes, homework, and tests" (p. 45). The mathematics education literature contains very little research evidence but widespread speculation about the possible causes of math anxiety including mathematics curricula, negative sex-role stereotyping, sex bias in instructional materials and practices, and deficient educational advisement to name a few (Richardson & Woolfolk, 1980). From anecdotal records of math-anxious preservice teachers in their study, Kelly and Tomhave (1985) similarly reported "most math-anxious people can probably trace the cause of their anxiety to some of the following: timed tests, overemphasis on right answers and the right method, working at the blackboard in front of peers, lack of acceptance of nontraditional problem-solving methods, and such negative

counseling as, 'You won't need this,' or 'You aren't smart enough to learn this' "(p. 53). In her review of this literature, Williams (1988) concluded that the overwhelming majority of these speculations imply that math anxiety may be a function of math teaching. Math educator M. Lazarus (in Richardson & Woolfolk, 1980) for example, has listed several aspects of the early math experience which frequently lead to "mathophobia" including heavy reliance on a "memorize-what-to-do" approach which discourages the divergent thinking and higher-order problem-solving necessary for success in higher grades, the social acceptability of being "no good at math" and the lack of meaningful connection between school math and the rest of a student's life.

While few theories of math anxiety have been set forth, math anxiety researchers to date have generally adopted a theoretical base from test anxiety (Hembree, 1990). Reyes (1984) for example, has used the interference model of test anxiety to explain how math anxiety can depress performance. She explains, "Anxious students often spend time engaged in negative self-talk, such as 'I am stupid' or 'I know I can't learn math.' In a learning or evaluative situation, it is reasonable that placing one's attention on such negative self-thoughts will interfere with attention to the task at hand and thereby reduce the level of performance on that task" (p. 168). Wigfield and Meece (1988) similarly suggest that the emotionality (nervousness, fear, discomfort) and worry (performance-related ruminations and negative self-talk) components of general test anxiety are supported for math anxiety. Hunsley (1987) has found further evidence from the internal dialogues of math anxious students prior to, during and after math exams that math anxious students engage in frequent negative thoughts related to doubts about their mathematical competence at all stages of math performance. Reyes (1984) has suggested, however, that it is important for researchers of mathematics anxiety to build theories that are based on both the psychological and mathematics education research literature as a more specific theoretical foundation is needed for research and interventions dealing with mathematics anxiety.

Common Interventions

The mathematics anxiety treatments and programs reported in the literature may be categorized as using either a math-dominated approach, a psychological approach (e.g., anxiety interventions and support) or a combination approach, apparently reflecting differences in the presumed cause(s) of math anxiety (Reyes, 1980; Williams, 1988).

The psychological approach involves one or more of the many techniques normally used in treatment of other specific anxiety-based problems, most commonly anxiety management training, desensitization and support groups, with the goal of "teaching people to deal effectively with anxiety itself" (Williams, 1988, p. 99). Behavioral interventions in this category (e.g., systematic desensitization, anxiety management training) typically involve individual work with a counsellor or therapist to learn physical relaxation and active coping response skills with gradual exposure to feared situations through guided imagery and eventual transfer to real life situations. Audiotapes are often used for client practice of these skills (e.g., Vander Zyl & Lohr, 1994). Cognitive interventions (e.g., stress inoculation training, systematic rational restructuring) involve awareness and replacement of negative, maladaptive self-talk with more rational, adaptive self-statements. (For descriptions of behavioral and cognitive interventions for math anxiety, see Schneider & Nevid, 1993; Vance & Watson, 1994). The results of Hembree's (1990) meta-analysis suggest that behavioral methods (relieving emotionality) such as systematic desensitization when used along with cognitive treatments (relieving worry) have been highly successful in reducing mathematics anxiety levels. Later studies (Schneider & Nevid, 1993; Vance & Watson, 1994) have continued to confirm this finding.

Support groups have also been used to assist math anxious individuals to control and overcome their anxiety. According to Tobias (1993), several women's groups have been developed in which participants undergo "math detox" through talking about "math messages," and receive assertiveness training as well as training in "class management techniques" in six to eight-week sessions. Such "Reducing Math Anxiety" groups have been offered for many years in

the Women's Studies department at the University of New Mexico and at the University of Utah. Counsellors at the University of Florida also offer "Math Confidence" groups – their treatment of choice for math anxious students (Probert & Vernon, 1997). Following an individual session with a counsellor in which a math history is taken, students experiencing difficulties with math or math-related courses come together in a group to learn strategies for overcoming anxiety and "psychological blocks" and improve their time management, learning, and study skills. Regarding the effectiveness of these groups, Probert & Vernon (1997) report:

We have found significant, long-lasting, self-reported improvement in math performance and in the ability to learn and use mathematics, as well as a reduction in math and test anxiety. Students tell us that the groups present them with tools which they employ to overcome their fears. They become aware of their habits and thought processes and are empowered to conquer their anxiety. They report that they find they can carry with them the skills and confidence they learn from the groups long past the end of the sessions. They are also able to apply what they have learned to non-math courses and other potentially stressful situations.

Williams (1988) cautions however that although many of the psychological approaches to math anxiety treatment have been found to be "effective" in reducing self-reported math anxiety, as the data are not often comparable, effectiveness comparisons cannot be drawn between them.

Math-dominated approaches involve teaching math content, often altering typical math instruction, with the goal of increasing skills and therefore learner confidence in math. While curricular changes alone (e.g., use of microcomputers or calculators; small group or self-paced instruction) have not been found effective in reducing math anxiety (Hembree, 1990), some success through teaching math content has been reported by instructors who frequently encounter math anxious students in their classes. Elementary mathematics methods instructors for example, have reported significantly reduced math anxiety following teacher inservice programs involving manipulatives and computer-based applications (Piel & Gretes, 1992) and active, manipulatives-based learning (Sloan, Vinson, Haynes, Gresham, 1997). Gunawardena (1996) similarly reported that a "Statistics Made Interesting" approach in teaching a required introductory statistics course

led to reports of high student enjoyment for her mostly math fearful students. Her students particularly liked the fact that the course was "entirely different" from what they had expected. Norwood (1994) in teaching developmental arithmetic at a community college has also found that a highly structured, algorithmic approach is more comfortable for high anxious students and therefore leads to less anxiety than a less structured, conceptual approach. It should be noted that while such research reports emphasize reduction of math anxiety through successful (clear, relevant) instruction of math skills, it is likely that some aspects of the psychological and group support approach have also been employed in these interventions (e.g., a comfortable learning environment created by a math-anxiety aware instructor, support of other math-anxious learners and safe, repeated "exposure" to the feared situation). This conclusion is supported in the study by Sloan, Vinson, Haynes, and Gresham (1997) in which interviews with their elementary math methods students revealed that many students attributed their reduction in anxiety to the methodology and inviting atmosphere of the course.

Combined approaches to math anxiety treatment involve "talking about math" and thereby dealing with feelings in conjunction with the learning of math. A representative design among the few interventions described in the literature is that used by the "Math Anxiety Clinic" offered at the University of Arizona (see Tobias, 1993, and the "Mind Over Math" groups of Kogelman & Warren, 1978). Run jointly by a counsellor and a math instructor, clinic participants initially discuss their prior math experiences and feelings about math, then gradually begin to tackle some basic math topics of interest to them such as fractions, percent and word problems over several weekly sessions. Strategies for anxiety-reduction and overcoming resistance are incorporated in each session along with "processing" of participants' basic math questions and feelings as they arise.

Although many of the growing number of treatment programs for mathematics anxiety have not been formally evaluated (Reyes, 1984), anecdotal reports of program developers (as reviewed by Tobias, 1993) suggest that these programs are very popular and long-running, user

satisfaction is high and many of the students who complete them go on to overcome a math hurdle such as a required course. A continuing problem reported by Tobias (1993) however, is that not all community colleges and universities offer formal math anxiety reduction courses. She suggests that students could lobby for these offerings, but "until specialists are found to *teach* math anxiety reduction, they may have to teach themselves" (p. 245). For this reason, some experienced math anxiety course instructors have created self-help books for math avoidant individuals. The self-help workbook created by Cynthia Arem (1993) *Conquering Math Anxiety* and Kogelman & Warren's (1978) *Mind Over Math* are popular examples.

Today, although these interventions would not be on the generic list of workshops offered at every college and university (e.g., career explorations, study skills, stress management), there is evidence that some counsellors have developed the interest and expertise to offer them. An encouraging recent trend in the literature is the reporting of more cooperative approaches between counsellors and instructors of developmental math courses. Seon & King (1997) for example, described a comprehensive intervention program at a community college in which math instructors were paired with counsellors, students met with both to discuss strategies for success and attended a series of workshops covering time management, math anxiety, test-taking and memory skills, note-taking and study skills for math. They concluded: "Not only did the students benefit, with pass rates in each target group improving significantly, but faculty also learned a great deal about math study skills" (p. 7). They also noted the important result that faculty and administrators credited "attention to the behavioral/affective dimension of student learning as the primary reason for the program's success" (p. 7). This sharing of information regarding math anxiety and math study skills has also begun to be transferred to the WWW. In addition to several "virtual pamphlets" on math study skills and test anxiety provided by counsellors, math professors have also begun to post information related to math anxiety on their websites (e.g., Arem's Math and Sciences Study Skills & Overcoming Test Anxiety Homepage at: <http://west.pima.edu/~carem/index.htm> and Professor Freedman's Math Help at:

<http://www.geocities.com/CollegePark/Quad/4392/>). To date, there is no evidence of further efforts to create online math anxiety interventions.

In sum, math anxiety is a widespread and debilitating issue that counsellors and math instructors are often faced with when dealing with prospective and current students in post-secondary institutions. While some have developed highly effective live group interventions, these are likely the exception rather than the rule. The development of an online intervention for math anxiety may then: 1) provide an opportunity for testing the viability of transferring and delivering such interventions online and thereby making them available to distance learners and those who are unable to receive regular on-campus counselling and 2) serve as an important resource for counsellors, learning assistance personnel and instructors who are not well prepared in this area or require material to supplement their existing efforts. The methods used in the development and evaluation of the online workshop will be described in Chapter 3.

CHAPTER III

METHOD

This research and development project was conducted in two phases. First, an online version of a mathematics anxiety counselling workshop was designed, developed, tested for usability, and revised. Second, the new workshop was delivered online to a group of math-anxious volunteers and a qualitative investigation of user reactions to the workshop and online delivery format was conducted. A description of the workshop and online development process is presented below, followed by details of the specific instruments and procedures used for its evaluation. A brief discussion of the methodological considerations addressed in each phase of the project is also provided.

Phase I *Going Online*

The basis for the investigation of user reactions to online student support was *Math Study Skills for the Reluctant* [<https://webct.srv.ualberta.ca/public/MASSLabA1/index.html>], a fully online counselling workshop created for this study. I chose this particular workshop for online development and delivery within the Faculty of Education as it is well-documented that many preservice and inservice teachers suffer from mathematics anxiety (see review by Hembree, 1990) and at the time of development, there were few resources available at the university to specifically address this need. I also agreed with the advice of my supervisor that while other topics under consideration such as mature student survival skills would be highly appropriate for development within our faculty, it would be wiser to use a workshop that I had previously developed and delivered successfully live. I was most familiar with the goals, content and process of the math anxiety workshop and so as the counsellor-researcher, would have a better basis for comparison of process and outcomes.

Workshop Design

Math Study Skills for the Reluctant was designed to be presented completely online through WebCT (Web Course Tools) version 1.3.1 (see <http://www.webct.com>). WebCT is a

courseware product for developing and delivering interactive courses over the Internet, created by educators at the University of British Columbia to “allow other educators without a lot of time, resources or technical expertise to build sophisticated web-based learning environments” [http://208.31.12.64/try/what_is.html#orig]. (See below for a description of WebCT features). As I was inexperienced with web development and WebCT was currently recommended and supported by the University of Alberta Department of Computing and Network Services, it was selected as the optimal platform for development and delivery of the workshop.

Online design considerations. Several considerations related to putting the workshop online were addressed in designing the workshop (see also Procedures below for ethical considerations and safeguards). One goal was to simulate both the instructional and therapeutic experience of the successful live counselling workshop as much as possible through the use of available multimedia presentation methods and WebCT features. My wishlist of important workshop features for inclusion such as an informal atmosphere, highly interactive math and study skills presentations, group discussions, etc., was drawn up and online equivalents (e.g., informal graphic design, mixed presentation media, interactive exercises and online discussions) were identified if available through WebCT or created if necessary (see Workshop Curriculum and Features below for details). As it was likely that the target audience would include individuals with varying amounts of computing experience, computer anxiety and time available, the second design goal was to minimize user frustration and initial computer knowledge needed for navigation through the workshop and operation of supplemental media (i.e., maximize user friendliness). Third, as the content was meant to be followed in a linear fashion, with learners gradually learning more coping skills and then easing into exposure to math, online instructions were designed to encourage completion of each session in page order. Steps were also taken to minimize opportunities to “jump around” within and outside of the workshop content (see navigation and links information below). A final goal was to maintain a workable length so that

users could complete the workshop online within a reasonable time period (approximately 8 - 10 hours).

Content goals. The overall design and session contents were created based on an eight-hour workshop that I previously developed to meet counselling needs at a university-college (see Kamann, 1992). The original workshop was designed specifically for a student (and prospective student) audience – those facing math courses, requirements and exams – to help them feel calmer and more “in control” when dealing with math. The theoretical approach to counselling used in workshop planning was that of instructional counselling (Martin & Hiebert, 1985) which involves: assessing presenting problems; assessing related client strengths, information base and skills deficits; teaching skills and knowledge needed; arranging for safe practice and feedback for skills development; and application of new knowledge. Following this model, the specific workshop goals were:

- to help students understand the nature and possible causes of math anxiety in themselves and others;
- to promote the realization that many others share the same fears;
- to dispel common math myths and learn about the true nature of math (improve attitude toward math);
- to help students assess their current math knowledge/identify areas of strength and weakness;
- to teach math study skills and coping skills for managing anxiety;
- to provide a success experience with math learning through “safely” tackling common stumbling blocks such as fractions and negative numbers; and
- to assist in planning appropriate next steps.

Workshop curriculum. The curriculum of the online workshop is summarized in detail in Table 1 (see also Appendix A for the online Site Overview and Contents page). Within each session, new themes were introduced using research or theory-based text presentations or “mini-lectures”, visual and auditory media, brief related readings, self-assessments, structured-experiential exercises and a counsellor-directed discussion. Instructional presentations, guided self-exploration and application exercises were the primary methods used for encouraging learning and behavior change (counselling). Multi-media presentation of the stories and feelings of a variety of math-anxious individuals such as math-anxious students, a Kindergarten teacher,

Table 1 Online Workshop Curriculum and Instructional Devices

Workshop Dimensions	Session 1	Session 2	Session 3
THEMES	Introductions Math anxiety Personal math reactions Assessing math knowledge	Math myths Instruction that “fits” Reviewing numbers How to learn math: strategies	Emotional blocks Reviewing more basics More coping strategies Approaching higher math Next steps
PRESENTATION TOPICS, ONLINE READINGS + HANDOUTS	What is math anxiety? Types of anxiety reactions & knowing yours Where does it come from? What can be done? <u>Online Readings</u> <i>Overcoming math anxiety</i> (University of Florida) <i>55 cultural reasons why too few women win at math</i> <u>Handouts</u> <i>Math Anxiety Bill of Rights</i> <i>Math Journal</i>	Math myths Learning theory: Bloom’s mastery variables Gentle Numbers refresher Note taking for math Managing self talk <u>Online Readings</u> <i>Learning Styles</i> (Funderstanding website) <u>Handouts</u> Buzan’s number calculation exercise Divisibility rules	Math stumbling blocks Fractions, decimals, percent Relaxation, writing, mnemonics Higher math, problems, exams Prevention and next steps <u>Online Readings</u> <i>The Trouble with Math</i> Intro to <i>Calculus Made Easy</i> <u>Handouts</u> Fractions summary Symbol Shock! Math study tips Multi-sensory teaching <u>Audio clips</u>
MEDIA USED	Virtual group pop-up intros <u>Slide Shows with audio</u> Anxiety theory – how & why we become anxious <u>Updating “chalkboard”</u> Coping steps <u>Audio Clips</u> Student feelings about math Student anxiety responses <u>Video Clips</u> <i>Math is Everywhere</i> (On-Air Science & Math Fair)	<u>Updating “chalkboard”</u> Naming sets of numbers Multiplication algorithm <u>Audio clips</u> Math mind? (<i>Mind Over Math</i>) Intro to numbers Approximating answers <u>Video Clips</u> Basketball math (<i>Big</i>) Finger math (<i>Stand & Deliver</i>) Math lecture (<i>Math Factor</i>)	A teacher recalls her own math struggles Progressive relaxation Teacher’s happy ending <u>Video Clips</u> Algebra rules by rote (<i>Stand & Deliver</i>) Formal math exam (<i>Stand & Deliver</i>)
STRUCTURED EXERCISES / ASSESSMENTS	<u>Input boxes</u> Your intro When/how you react to math Your math skills summary <u>Exercises</u> Simulated pop-quiz <u>Self-assessments</u> Composite math anx. scale Math basic skills test <u>Homework assignments</u> Math memories	<u>Input boxes</u> Your learning style Negative to positive self talk <u>Self-assessments</u> Learning Styles Survey Multiplication facts Whole numbers mastery Math words crossword <u>Homework assignments</u> Learning styles + whole numbers practice	<u>Input boxes</u> My stumbling blocks <u>Exercises</u> Visualizing fractions The Fractionator Progressive relaxation Interactive algebra <u>Self-assessments</u> Fractions ,decimals, percent <u>Homework assignments</u> Fractions, basics, next steps
ONLINE PARTICIPANT OR VIRTUAL GROUP DISCUSSIONS	<u>Virtual Group</u> Group member introductions 15 previous student intros <u>Bulletin Board Discussion</u> <i>Origins of your math anxiety</i>	<u>Virtual Group</u> Ways to calculate 76-38= <u>Bulletin Board Discussion</u> Math myths or not?	<u>Virtual Group</u> Math attitude changes Next step plans <u>Bulletin Board Discussion</u> Math stories/changes so far

an early childhood math specialist, and previous workshop attendees were also included to promote increased realism and personalization of the content as learners compared themselves to others.

The workshop involved two major curriculum components: a) *counselling-related instruction* designed to help learners understand and begin to cope better with their math anxiety and b) “gentle” (non-threatening), refresher *math instruction* in fundamental math topics such as whole number operations, fractions, decimals, percent and beginning algebra concepts. The math instruction content was included to provide a chance for anxious learners to practice application of new coping and math learning strategies within a “safe”(non-competitive, non-graded) environment. It was also designed to help individuals overcome learned helplessness with math by providing an opportunity to re-approach some of the basics through adult eyes and discover that they can be mastered much more easily than previously thought.

Workshop Description

The final online version of *Math Study Skills for the Reluctant* consisted of three self-paced workshop sessions or modules presented via 60 main web pages within the WebCT framework. The *online workshop* could be described as an electronic version of a self-help workbook with interactive exercises, sound clips, slide shows and video built in (see Table 1 for specific session details) along with links to extra resources and the possibility of communicating with the counsellor-instructor and other participants as desired. The term *workshop* was used to emphasize the personal development nature of the offering in contrast to an online *course* with assignment deadlines, grading and course credit. In the following paragraphs, specific features of the online workshop, both those built into the WebCT framework and those specially developed for this project, are described.

Navigation. When students log on to a WebCT course, they are presented with the main home page. The home page can be customized by the course designer to contain buttons (icons attached to hotlinks) that users can click with a mouse to go to frequently needed pages and tools,

such as the contents list or electronic mail. The customized home page for the online workshop is shown in Figure 1 below. The *resume session* button may be used by those who have previously

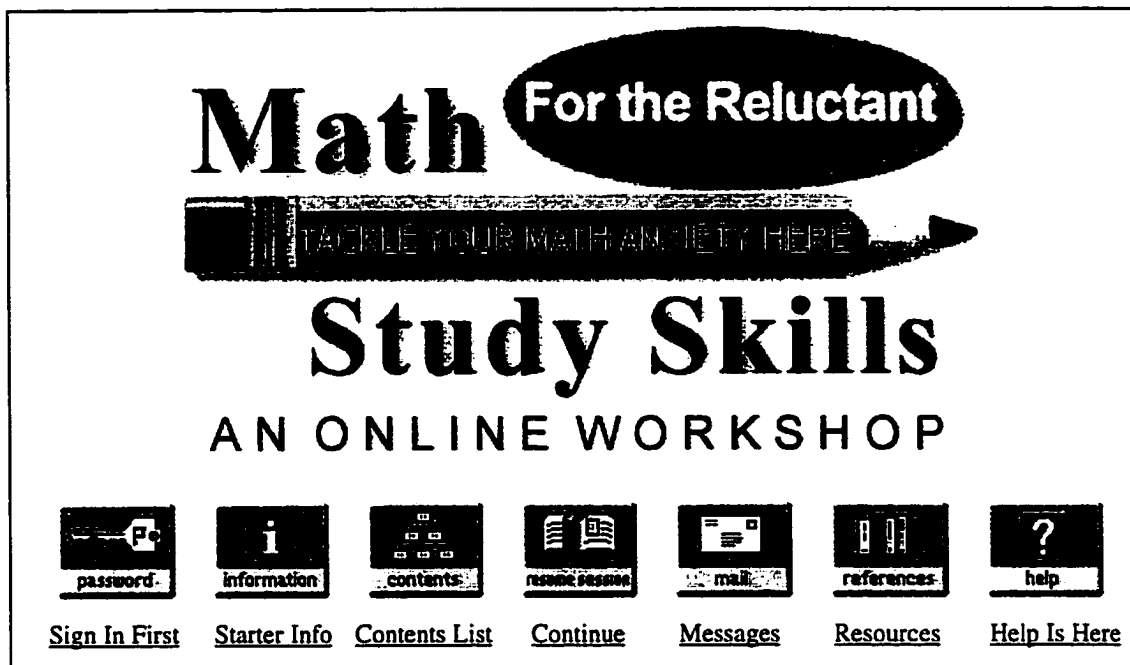


Figure 1 Workshop Home Page

logged on, to go directly to the page of content they were on when they ended their last session.

Once inside the workshop on the main contents path, navigation buttons in the left frame on every page allow students to move easily through the workshop content. Figure 2 taken from page 2 of the workshop (*Online Workshop and Site Navigation Info*) describes this navigation feature:

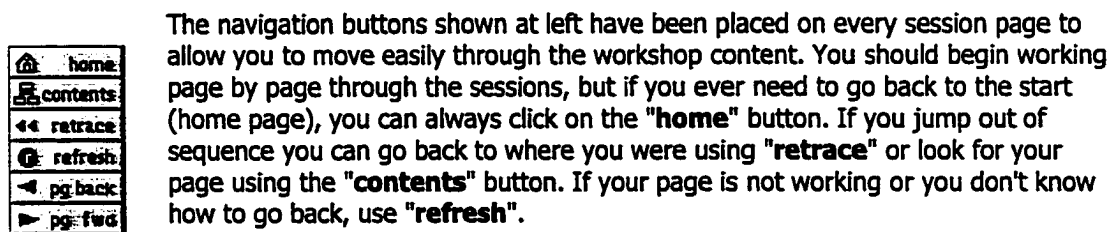


Figure 2 Navigation

In order to limit user disorientation when linking to a page that was not part of the workshop content (e.g., a link to an outside learning styles web page), external links were specially

programmed to bring up the new page within a smaller "pop-up" browser window on top of the current workshop page. When this off-workshop page or site had been explored, the pop-up window could be closed and the user would still be on their current workshop page.

Communication modes. Two of the built-in communication modes available in a WebCT course were selected for use in the online workshop: the internal course electronic mail facility and the course conferencing (bulletin board) system. Electronic mail allows users to send private (one-to-one) messages to the course instructor and other workshop participants, if desired, using a built-in participant names list. The bulletin board allows all participants to read public announcements and messages "posted on the board" from the instructor to the group as well as to read and respond to the collective questions, answers and comments posted by participants and organized under different topic threads or *fora*. Figure 3 shows the full bulletin board window. Entries for each posting made within a particular forum are listed in the top frame and the full text of the selected entry is given in the bottom frame. The left frame contains the bulletin board

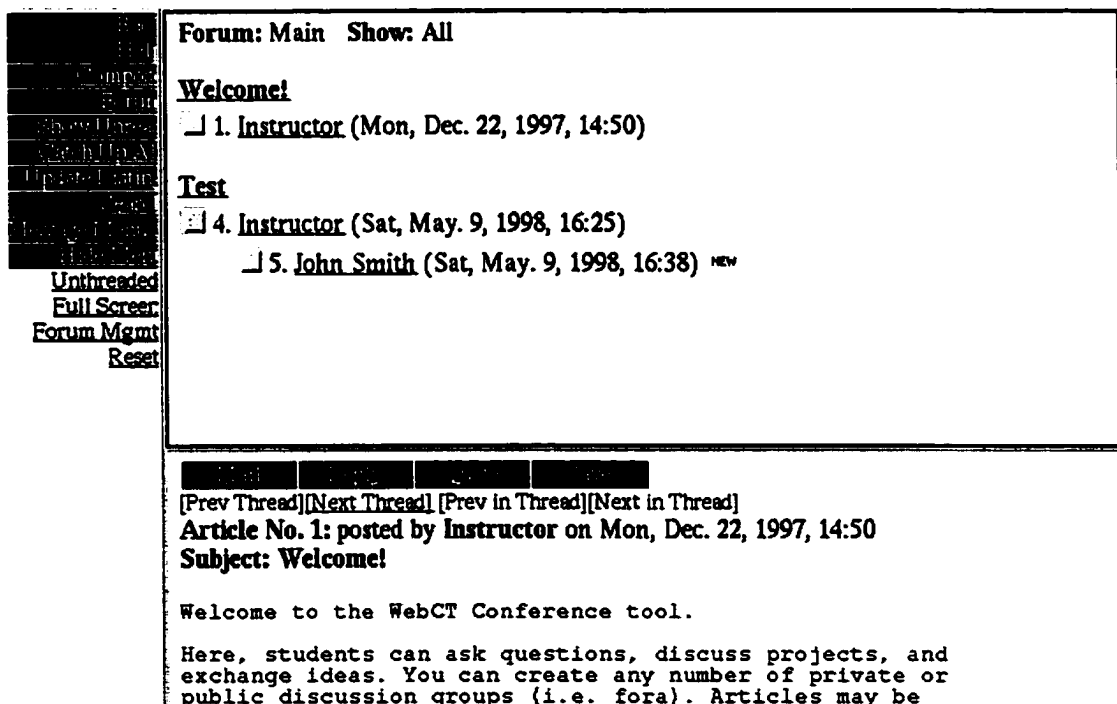


Figure 3 Bulletin Board

functions and options as well as a Back button to return to the workshop.

The WebCT electronic mail and bulletin board systems share many features so that new users can transfer their understanding of one tool to another. For the online workshop, both the mail and bulletin board icons were placed in the left frame of every workshop page to allow easy access to the tool when needed and navigation back to the original page. The mail icon was also placed on the homepage to ensure that participants would check for new messages (indicated by highlighting around the icon) at each logon.

Media. WebCT's audio and video clip utility was used throughout the workshop sessions to associate audio (.wav) and video (.mov) files to specific workshop pages. Users accessed the clips by clicking on the audio or video icon placed on the button bar of such pages to bring up a media viewer. Animated icons (headphones and TV screen) were also used in the online workshop to indicate when participants should use the audio or video clip viewer. In addition to the supplementary audio (n = 10) and video (n = 7) clips used, some of the workshop pages were specially programmed to include embedded sound files that played as background sound when the page was viewed. This technique, when used with a series of graphics displayed on consecutive workshop pages (see Figure 4), gave the effect of a narrated slide show.

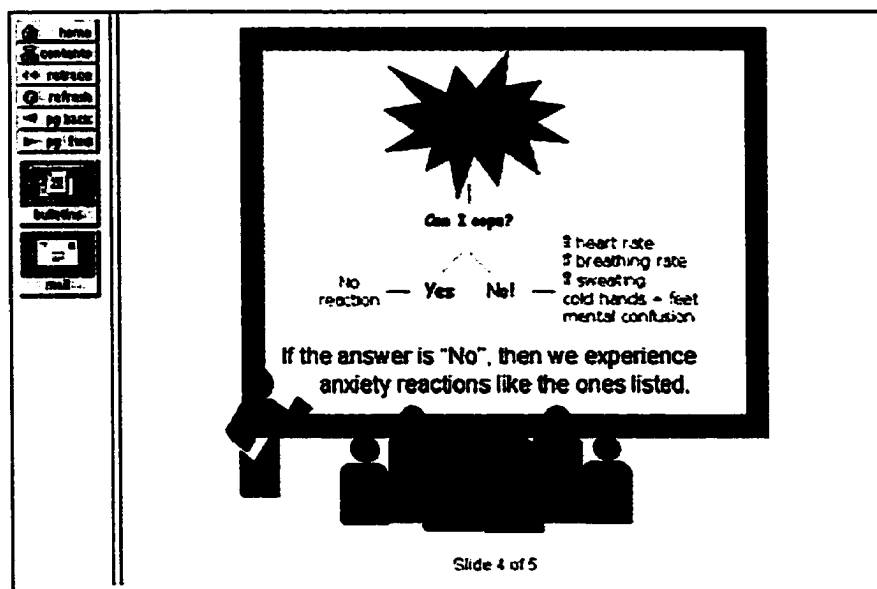
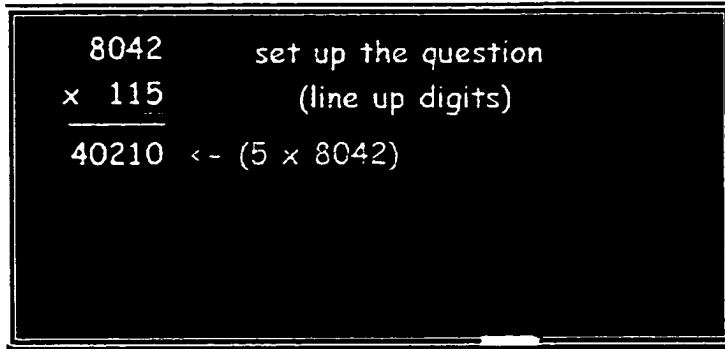
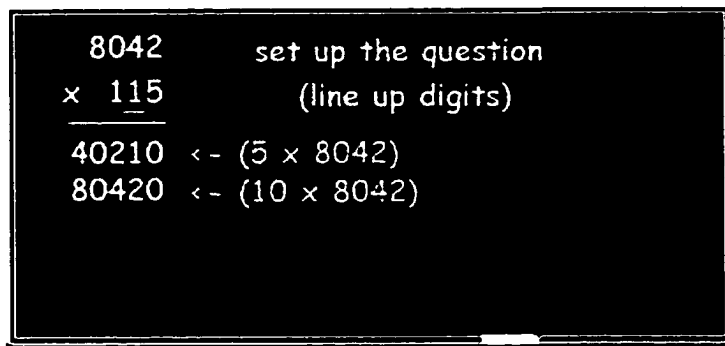


Figure 4 Slide Show

JavaScript programming was also used in the workshop to simulate visual demonstrations and animation and to add interactivity. A user-controlled updating virtual “chalkboard” (e.g., to show subsequent steps in the multiplication algorithm) was created in this way (see Figure 5).



Frame 1 On forward click, replaced by frame 2 below



Frame 2 On backward click, replaced by frame 1 above

Figure 5 Updating Chalkboard

This programming method was also used to create a “virtual group” of workshop participants (Figure 6) based on people who are typically found in the live workshop. When the virtual group appeared, participants could follow a typical group discussion by clicking on each person to change the portrait and text.

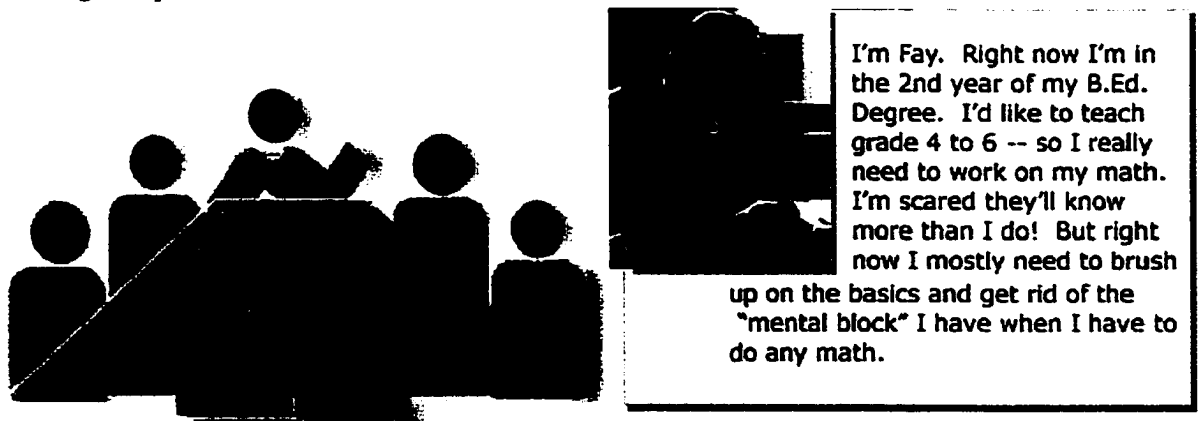


Figure 6 Virtual Group (Fay selected)

Self-tests and exercises. The WebCT computer scored quiz tool was used to give an online self-test (Composite Math Anxiety Scale) and pop-quiz. When indicated in the workshop text, participants could access a self-test via the self-test button placed on the button bar of the page. The participant's self-test responses and score interpretations were given upon completion of the test to promote self-analysis. A self-scoring *Math Basic Skills Test* was also specially created for the workshop using JavaScript programming. This self-test allowed participants to access and view the whole test more easily than the built-in self-test, to only complete subsections if desired, and to check and view correct answers to each question by clicking a Check box available for each subsection.

Within sessions, participants were also encouraged to participate actively in response to questions posed, by typing their own answers into specially created *input boxes* when provided (shown in Figure 7). Online orientation instructions informed participants, "You will be encouraged to 'talk' in the workshop by typing your own thoughts on discussion topics into answer boxes to be submitted to the counsellor." For brief question and answer exercises, input boxes were programmed directly into pages of the online workshop, rather than using the self-quiz option, in order to keep participants on the current page.

Your Turn:

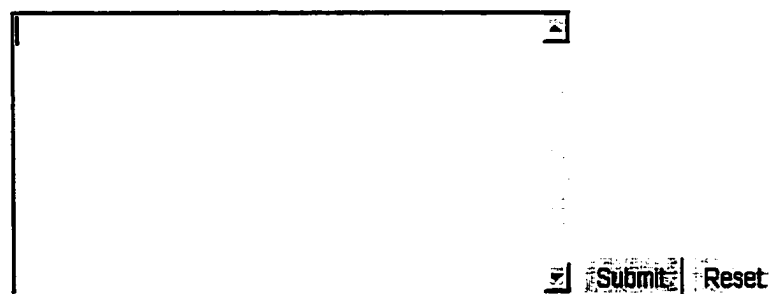
The image shows a screenshot of a web interface. At the top, the text "Your Turn:" is underlined. Below it is a large, empty rectangular input box with a thin black border. In the bottom right corner of the input box, there are two buttons: "Submit" and "Reset". The "Submit" button is slightly larger and more prominent than the "Reset" button. The background of the page is white, and the text is in a standard black font.

Figure 7 Within-Session Input Box

In order to encourage practice and active use of the workshop content between sessions, a personal application-based homework assignment was also provided at the end of each session, to be printed and completed off-line.

Support. WebCT provides a built-in online help manual for both the e-mail and bulletin board features that is easily accessible to users from the functions panel. As built-in support is not available for other course features, a *Helpline* page was created for the workshop, accessible from the Help button on the homepage. The Helpline page reminded participants that they should feel free *at any time* to: a) *ask the monitor* if they required help with the operation of the workshop or equipment and b) *send the counsellor a message* using the mail button available on each page, to discuss difficulties with personal reactions, workshop content or exercises. In addition to the homepage, a Help button was placed in the button bar of pages where support was more likely to be needed with interactive features (e.g., the Math Basic Skills Test), as a reminder that help was available and should be used. Reminders to take breaks and e-mail for help to avoid overload and frustration were similarly inserted on pages containing more challenging content (an example is given in Figure 8).

Check Yourself This is the point to ask, if we were in a classroom, "Any questions?" If you have questions to ask or concerns about your reactions at this point or at any point, remember you can stop and send an e-mail to the counsellor (you'll get a message back next time you start) then take a break at the Comic Relief page for a while.

Figure 8 Example Reminder Note

Finally, a friendly, conversational tone and humour were used throughout to create an informal, supportive atmosphere.

Student tracking. Part of the built-in tools for course administration within WebCT is Student Tracking, a utility that allows the instructor to monitor student progress and participation in the course. Instructors can view each student's first course access date and time, last access date and time, number of accesses to course material to date (total number of "hits" or accesses to course pages) and coverage of material (percentage of the total course pages), history of pages visited, number of bulletin board articles read and number of postings made to the bulletin board. Whole group results are also available and can be used in making class comparisons.

Security. WebCT includes necessary features for a secure or *closed* course environment. Course access is controlled by the course instructor through the creation of individual password-protected accounts (i.e., only registered users can enter the workshop and access their own messages or contribute to the discussion group). As an additional precaution in the online workshop, in order to preserve the privacy of participants, the creation of guest accounts from the home page was not allowed. Security during transmission of potentially sensitive workshop communications was also assured as the workshop files were located on a secure server¹ designated for delivery of WebCT courses at the University of Alberta [<https://webct.srv.ualberta.ca>].

Development Procedures

I designed, developed and programmed the online workshop over a period of six months with the assistance of an external technical consultant (overall design and JavaScript programming concerns) and the university's staff WebCT consultant (WebCT server concerns). Occasional programming assistance for some of the handouts and JavaScript-based interactive exercises was also provided by two highschool computing students. The workshop material was converted to a web-based format primarily through the use of WebCT's built-in web page development tools, supplemented by the Microsoft FrontPage (conversion to HTML) and Adobe Photoshop (creation of web-friendly graphics) software packages. Audio clips featuring student and counsellor voices were created informally using the MicroSoft Windows 95 Sound Recorder with my own voice for the counsellor and those of volunteer "actors" from the Undergraduate Student Services office for the students. Video clips not available through online sources were also specially created from videotapes using the Adobe Premiere videocapture software under the direction of an undergraduate technology student.

¹ A Web server is the computer program, housed in a computer connected to the Internet, that serves hypertext or web-readable pages and files as requested by a Web browser such as Netscape. *Secure* servers and browsers also use a security software program to encrypt or scramble information as it is passed between server and browser so that it cannot be read until unscrambled by the intended recipient.

The online workshop sessions were pilot-tested by three Library and Information Sciences graduate student research assistants who worked through the sessions, page by page, noting clarity of text, usability of site (e.g., ease of navigation, extra instructions needed) and any technical difficulties encountered. This information was used to make further modifications to the overall site, general instructions, session pages and within-session programming prior to Phase 2.

Phase 2 *Test Drive*

Study Overview

The workshop evaluation study took place over a five month period in the spring and summer of 1999: two months were allotted for recruitment and three months for the main workshop delivery and evaluation. In addition to ensuring the application of ethical safeguards (see below), the guiding principle in designing the study was that of ecological validity: the goal was to simulate, as much as possible, a student services-realistic method of delivery from recruitment of workshop attendees to provision for support at workshop completion.

Undergraduates, graduate students and non-students wanting help to overcome their math anxiety were recruited on campus via flyers, newsletter ads and in-class announcements. Interested individuals were informed about the online workshop and study through information packages available at Undergraduate Student Services in the Faculty of Education or through contacting me via telephone. Those wishing to continue, completed and returned paper-and-pencil student assessment inventories (Student Information Questionnaire, Target Complaints, Computer Thoughts Survey and Mathematics Anxiety Rating Scale) and booked an appointment for their first session (see Chapter 4 for numbers and descriptions of participants). Prior to beginning the workshop, all participants were in contact with me at least once to receive assistance in evaluating the appropriateness of the workshop for their needs and time availability.

The workshop was delivered online in a supervised computer lab setting on campus (exceptions to this setting are noted in Chapter 4) with participants scheduled into weekly lab sessions, as convenient for them, with a maximum of five participants in one lab. One trained

research assistant provided an orientation to Netscape and WebCT controls as necessary during each participant's first session and was present in the lab to assist with printing and other technical needs for all scheduled lab sessions. The scheduled research assistant also served as the receptionist and troubleshooter for the workshop operation, collecting and returning homework assignments, booking next lab appointments, and distributing and collecting equipment (headphones) as necessary. In contrast, except for occasional live (telephone) contact for last minute rescheduling, my role as counsellor was limited to responding to online messages, monitoring and participating in the workshop bulletin board and responding to submitted homework assignments.

During their completion of the online workshop, participants' workshop use and session evaluation data were collected on an on-going basis. While online, participants' site use was tracked by the built-in student tracking system and bulletin board postings, e-mail messages to the counsellor and responses made in input boxes were electronically recorded. Lab attendance records as well as observations of user needs and affective reactions during each lab session were also made and recorded onto paper-and-pencil log sheets by the scheduled research assistant. At the end of each workshop module, participants completed an online session evaluation questionnaire including ratings and brief written responses regarding their reaction to the session. Also at this time, any completed homework assignments were collected or returned (sealed) with my (counsellor) feedback.

Following each participant's completion the workshop, I personally conducted final interviews with them in a private setting, following a general interview guide (Appendix E) designed to gather their overall reactions to the online method of workshop delivery and their perceptions regarding the benefits and difficulties of its use. At this time, each participant's needs for further counselling were also assessed and assistance was given if necessary to find further counselling resources or plan next steps in math improvement.

Data Gathering Instruments

Participant Pre-Assessment Measures

Participant information. Information regarding participant characteristics was collected using a brief *Student Information Questionnaire* (see Appendix A). In order to allow detailed description of the sample for analysis and reporting purposes, participants were asked to provide information regarding their age, gender, current educational program and career goal, level of education completed, mathematics background and math needs. In addition, respondents were asked to briefly describe their general math-related concerns and specific math and counselling needs from the workshop.

Mathematics Anxiety Rating Scale (MARS). Participants' level of mathematics anxiety was measured using the *Mathematics Anxiety Rating Scale (MARS)* (Richardson & Suinn, 1972). The MARS is a widely used 98-item scale constructed to provide a measure of anxiety associated with the manipulation of numbers and the use of mathematical concepts. The questionnaire is composed of brief descriptions of ordinary life and academic behavioral situations, for example, "adding two three-digit numbers while someone looks over your shoulder," that may arouse different levels of anxiety in respondents. A wide variety of situations are included to permit its application to a diverse group of individuals, including both students and nonstudents. Respondents are asked how anxious a particular situation makes them feel and to record their responses on a Likert scale with range from 1 (*not at all*) to 5 (*very much* anxious). The item scores are summed to give a total range of 98 to 490, with higher scores reflecting higher mathematics anxiety.

According to Sovchik et al. (1981), the MARS exhibited high reliability using coefficient alpha (pretest = .978, posttest = .982) with elementary education math methods students and has been tested at the University of Missouri and Colorado State University, yielding test-retest reliabilities of .78 and .85. Evidence for the construct validity of the MARS has been provided by three studies in which MARS scores decreased after behavior therapy and by two studies in

which MARS scores correlated negatively with scores on the Numerical Ability subtest of the Differential Aptitude Test ($r = -.64$, $r = -.35$) (Rounds & Hendel, 1980). Further validity data has also been reported by Brush (1978) who found that the MARS "successfully differentiated among students in different majors and among those subgroups that had chosen to participate in or to avoid optional high school and college mathematics" (p. 489). In this study, students' scores on the MARS were also correlated with measures of dislike and anxiety about mathematics, performance in mathematical settings, and a measure of test anxiety.

Computer Thoughts Survey (CTS). In order to assess participants' degree of confidence in using computers and technology prior to starting the workshop and to allow pre-screening of severe technophobics if necessary, participants' pre-workshop cognitions and feelings about their abilities with technology were assessed using the *Computer Thoughts Survey – Form C* (Rosen & Weil, 1992). The CTS contains 20 self-statements that people may make when working with technology or contemplating working with technology. Eleven of the items are phrased in the negative direction (e.g., "I am afraid I'll wreck the program"; "I feel stupid") and nine are phrased positively (e.g., "This will be fun."; "Others have learned this and so can I."). Similar to the MARS, these statements are rated on a five-point scale (*not at all, a little, a fair amount, often, very often*) reflecting how often the respondent currently has each specific thought when using or thinking about using a computer. After reverse-scoring for negative items, higher total scores reflect more positive cognitions (range = 20 – 100). One of three instruments designed by Rosen & Weil (1992) to measure various aspects of technophobia in depth, the CTS was judged to be the most useful for this study as analysis of the specific items would allow detection of those students who currently react negatively to using computers and therefore better screening or preparation for training needs.

Rosen & Weil (1992) report from their research on the instrument that the CTS has proven to be reliable with Cronbach's alpha coefficients above .80 in six studies. Validity evidence has also been found: in two studies, one with summer school students in Psychology

courses using computers and another with elementary and secondary school teachers, the CTS correlated positively with self-reports of positive attitude toward computers ($r=.67$) and confidence using computers ($r=.59$) and negatively with degree of computer-related anxiety ($r=-.63$) and negative computer cognitions ($r=-.61$).

Workshop and Online Format Evaluation Measures

Target Complaints and expectations for counselling scale. Participant ratings of the nature and severity of their presenting complaints (reasons for wanting help) prior to and following the workshop were assessed using a paper-and-pencil Target Complaints questionnaire (Battle, Imber, Hoehn-Saric, Stone, Nash, & Frank, 1966). The questionnaire directs respondents to record their presenting complaint in their own words ("Please list your reason for wanting counselling help at this time"), then instructs them to rate the current degree of discomfort caused by the complaint ("In general, how much does this problem or complaint bother you?"). For this purpose, a 13-box rating scale was provided (see Appendix C). The descriptor *Not at all* was printed beside the bottom box, *A little* by the fourth box from the bottom, *Pretty much* by the seventh box, *Very much* by the tenth box, and *Couldn't be worse* by the top box. Participant ratings of their outcome expectations prior to counselling ("Please rate what you expect this level to be after completing the counselling sessions") were also obtained using the same 13-point scale appended to the Target Complaints Questionnaire (see Appendix C). For scoring purposes, each box was assigned a value between 1 and 13 with the first box *Not at all* equal to 1 and the thirteenth box *Couldn't be worse* equal to 13. At the time of their final interview, participants were again asked, orally or via e-mail when necessary, to rate their current level of discomfort for the stated target complaint using the 13-point scale.

The use of target complaints as criteria of improvement has been recommended by Waskow and Parloff (1975) who note that this measure is: suitable for use with any population, easy to administer, not offensive to clients, and sensitive to change. In validation studies reported by Battle et al. (1966), target complaints were found to correspond to the complaints obtained in

an intensive psychiatric evaluation interview conducted prior to a four-month psychotherapy study and to “correlate to a significant degree” with the four other outcome measures used: client and therapist ratings of overall improvement, client discomfort scale ratings, and social ineffectiveness ratings based on structured interviews. When obtained at different points prior to therapy and by different interviewers, target complaints and corresponding severity ratings using the box scale were also found by these researchers to be highly reliable.

Session evaluation questionnaires. Participant perceptions of the immediate effects or impact of each of the three workshop sessions were obtained using a session evaluation questionnaire developed for this study. Presented online as the last page in each of the three sessions, the evaluation form was designed to be completed and submitted online immediately following completion of each session.

The first half of the self-report instrument consists of two sets of three bipolar adjective scales presented in semantic differential format (see Appendix D). For each word pair, respondents are directed to describe their experiences of the workshop session, using a number between 1 and 5, where 1 means *more like the word on the left*, 5 means *more like the word on the right* and 3 means *neutral*. On the web page, the scales were presented with radio buttons for each of the numbers, in the format shown in Figure 9:

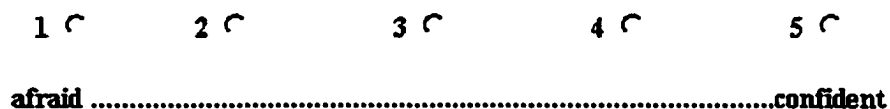


Figure 9 Session Evaluation Scale

The first set of adjectives presented (*dangerous/safe; difficult/easy; worthless/valuable*) elicited responses to the item stem: “This session was ...”. The second set (*sad/happy; afraid/confident; detached/involved*) were presented with the stem: “Right now I feel ...”. These descriptors and item stems were taken from the Session Evaluation Questionnaire (Stiles, 1980), a longer (24

item) post session self-report measure designed to measure therapy session impacts in terms of the degree of *depth* (i.e., power, value) and *smoothness* (i.e., ease, safety) of the session and the *positivity* (i.e., happiness, confidence) and *arousal* (i.e., energy, excitement) felt by clients following counselling. Such impacts related to effectiveness of therapy and degree of client distress are considered to be statistically the most substantial and clinically the most relevant of reported session experiences (Orlinsky & Howard, 1977). For the current study, as a briefer session evaluation was desirable given the burden on participants to evaluate the session immediately following a possibly lengthy period spent at the computer, only one quarter of the original SEQ items were used. The specific items selected were those thought to be most relevant for evaluation of the online workshop: i.e., to what extent participants found it safe, easy and valuable and left the session feeling happy, confident and involved.

The second half of the online questionnaire was designed to elicit participants' brief written feedback regarding the perceived strengths and weaknesses of the session just completed. Two input boxes are presented with the instruction to summarize: 1) "What was the most valuable part of this workshop session for you?" and 2) "What changes would you recommend for future versions?" These questions are the same as those used successfully for on-going evaluation of the live math study skills workshop.

Final evaluation interviews. Participants' overall evaluations of the online math study skills workshop after either completing the sessions or terminating their participation in the workshop were collected in semi-structured interviews of approximately one hour duration. The interview guide followed (see Appendix E) was designed to collect participants' perceptions regarding benefits received from participating in the math study skills workshop as well as their specific reactions to the workshop itself, online delivery format, media used, communication modes available, contact with the counsellor and other group members and finally their recommendations for change. Although I conducted the interviews myself in order to ensure that participants had not been affected adversely by the workshop and to assist in planning appropriate

next steps for them, particular effort was made to elicit honest responses from participants. Specific instructions given at the outset of each interview stressed that detailed, honest responses are the most useful for research purposes and therefore I needed individuals to be as truthful as possible about their reactions, both positive and negative, to different aspects of the workshop experience. In addition, I assured them that as this was a new delivery method, I was not committed to the approach but was most interested in *all* student reactions to it. As initial interviewees were hesitant when asked if they were comfortable with their responses being audiotaped, and as telephone interviewing was a likelihood in many cases, it was decided that the risk of taping causing concern, distraction or lack of openness in respondents was not worth taking and that all interview responses would be recorded by hand. Care was taken to include verbatim quotes as often as possible, with apologies to respondents for taking the extra time to do so.

Procedures

Recruitment

Potential workshop participants were recruited on the University of Alberta campus, through several of the typical routes used for advertising counselling workshops. A recruitment notice (see Appendix F) calling for those with *math fears* to seek help through the Faculty of Education Undergraduate Student Services Office, was printed on neon-coloured paper and made available to students in key locations on campus: Academic Support Centre, Student Counselling Services, Native Student Services, University Health Services, Faculty of Education Undergraduate Student Services, the Registrar's Office, Student Services Daycare Centre and Faculty of Extension. A letter of announcement (see Appendix G) and copies of the notice were also sent to reception staff at all campus departments and announcements were made in the Graduate Student Association electronic newsletter, Faculty of Education newsletter and in Spring term undergraduate Education classes. The flyers and announcements gave information regarding help offered, but not delivery method, and referred interested individuals to me at

Undergraduate Student Services for more information. This method allowed me to see or hear any negative reactions to online delivery rather than to risk missing this information with some potential participants self-screening based on fears of working via computer.

Screening and Registration

A procedures summary detailing the specific study activities of participants, counsellor and research assistants, from screening and registering participants to conducting final interviews, is provided in Appendix H.

Interested individuals who contacted me were assisted in self-screening for participation in the workshop through a brief in-person or telephone interview focussing on the nature of the help offered, appropriateness of their counselling needs and availability for attendance at a weekly lab. Suggestions of alternative resources were given to those who were not available during the times offered or who expressed needs other than those addressed in the workshop (e.g., statistics tutoring, math help for children). Those who wished to register were tentatively booked into a first lab appointment and asked to pick up an information and registration package from reception at Undergraduate Student Services. The registration packages contained: a) a brief *Registration Information* cover sheet (how to sign up); b) an *Explanation to Participants* study information and consent form (see Appendix I); c) *Student Information* questionnaire; d) *Target Complaints Questionnaire*; e) *Computer Thoughts Survey*; and f) *Mathematics Anxiety Rating Scale*. The registration instructions directed participants to complete and return pre-assessment questionnaires as soon as possible and if necessary, to sign up for a lab session through Student Services reception. The registration information and preassessment questionnaires were presented and completed on paper, rather than online, as it was thought that this method would be less intimidating and inconvenient for those who were not yet experienced in using the Internet. As soon as their registration information was received (there was no fee for the workshop), a WebCT student account was created for each participant and their lab booking was finalized. Returned registration packages were also reviewed at this time to ensure that there were no

participants with inappropriate needs or evidence of extreme technophobia. (A description of the participants recruited is given in Chapter 4.)

Workshop Delivery and Data Gathering Procedures

Ethical considerations and safeguards. In planning workshop delivery, several issues related to the ethics of offering a counselling workshop completely online were considered. First, as it was not known how math anxious students would react to online delivery (i.e., would they be particularly technophobic?), and what their counselling needs might be while using the workshop, it was decided that the online sessions should be initially delivered in a controlled lab setting. Similarly, it would be important that new users receive adequate orientation to the technology and that a lab monitor be present at all times to offer technical support and watch for negative reactions. Second, as participants might be self-conscious about being identified as math-anxious, steps should be taken to ensure confidentiality and anonymity if desired, in the lab setting and while online. In addition, all participants would need to be informed regarding measures to be taken to maintain their confidentiality in any reporting and further use of their online and interview data. Third, there was concern that as with any online communications of a counselling nature, someone outside the group having access to private transmissions or entering group discussions to harass participants was a potential risk. Therefore, it would be imperative that the closed course and data security measures available through WebCT be used at all times. Finally, as online counselling is a relatively new enterprise, counselling conducted during the sessions should conform to the *Standards for the Ethical Practice of WebCounseling* produced by the US National Board of Certified Counselors [<http://www.nbcc.org/ethics/wcstandards.htm>]. For the math anxiety workshop, the standards addressing the necessity of providing contact information for support available to clients in case of emergency and informing clients how often they could expect to receive a response from the counsellor were considered particularly essential (for actual information given to participants, see Appendix I *Explanation to Participants* and online instructions below).

Workshop environment and scheduling. The workshop sessions were delivered on campus in the H.T. Coutts Education library, in a reserved section of six computers within the computer lab (capacity 18). (For exceptions to this location, see Chapter 4.) The lab afforded a quiet environment closed off from the main library and library information personnel immediately outside who were able to assist with operation of the lab equipment. The set of computers reserved for the study were PCs (Pentium II, 4.3 GB Hard drive, 64 MB RAM) running the Windows 95 operating system and connected to the Internet and a laser printer. The installed software and hardware required for running WebCT included: an Internet application or browser capable of running JavaScript programs (Netscape Communicator 4.5), a browser plug-in for playing online audio and video clips (Real Audio/Video Player 6.06) and a sound card (SoundBlaster AWE64).

Workshop lab sessions were scheduled in 2 1/2-hour blocks, morning (10:30-1:00) and afternoon (2:30-5:00) Monday, Wednesday and Friday. An evening session was also booked for 5:00-7:30 on Wednesdays.

For each of the lab sessions, one of two female research assistants (RAs) was scheduled to be present at all times and a third was on call to act as a substitute when required. Research assistants who were comfortable using computers, familiar with the Internet, e-mail and course conferencing and who had successful experience working in a helper role with adults (qualities similar to those of a counselling centre assistant) were hired to work in the study. Female RAs were selected specifically as it was expected that most of the study participants would be females and that many may feel more comfortable approaching a female assistant for help. Two of the RAs hired for lab monitoring were from the Education faculty (one graduate and one senior undergraduate student) and one was a Library and Information Sciences graduate student. All were well-acquainted with the features of WebCT and the workshop contents from having worked through the workshop themselves prior to the start of the study.

Process. The participants were scheduled to start in the same week, whenever possible, in order to create a group of participants completing the online workshop at the same time and thereby allow the possibility of an online community through the bulletin board. In their first visit to the computer lab, participants were greeted by the scheduled RA and shown to a workstation which had been prepared for their use (Netscape running, U of A WebCT course list loaded, headphones available). Participants were oriented to the use of the equipment (volume control, browser controls), then to the WebCT log-in procedure (username and password) and workshop home page buttons through a 10-15 minute demonstration by the RA. For the lab set-up, orientation and lab monitoring activities to be carried out for the workshop sessions, RAs were given standard instructions to follow (see Appendix J).

Before starting the workshop, participants were encouraged to try the *Help*, *Mail* and *Contents* buttons from their own workstation and to ask questions of the RA. For the purpose of properly labelling data collected from input boxes and other JavaScript forms not tracked by WebCT, for this workshop participants were also asked to enter a name (pseudonym if desired) from the home page before starting each session. Once participants had signed in for the first time, online instructions directed them to begin the workshop at the top of the *Contents List* – the *Online Workshop & Site Navigation (“Getting Around”) Info* page where the functions of the WebCT navigation bar were explained along with some of the other workshop features such as the virtual group and communication options available. From there, participants navigated back to the Contents List and began Session 1.

For the remainder of the first lab session and all subsequent labs (see Appendix H *Procedures Summary*), participants worked at their own pace through each workshop module, printing desired handouts and readings and taking breaks or stopping for the day as necessary. Throughout the workshop sessions, the RAs positioned themselves close to the participants’ workstations without “hovering”, collected or handed back sealed homework assignments and provided ongoing assistance with the operation of WebCT and printing facilities when requested

by participants or when they noticed signs of mounting anxiety or frustration. This procedure of general reception, orientation and “on call” assistance was adopted as it was thought to best simulate the type of assistance provided by counselling staff when students are using counselling centre resources (e.g., computer-assisted career guidance). It also provided an opportunity to test the degree to which users could complete the workshop independently but with a “safety net” in place.

Acting as the online counsellor or facilitator for the workshop, at the end of each lab day, I reviewed submissions made by participants in input boxes and session evaluations to ensure that they were progressing well and if not, sent a mail message to the participant to offer suggestions and encouragement. At this time I also checked and responded to the mail and bulletin board postings (my original discussion questions for each session were already on the bulletin board), following up where appropriate, on points made in posts. If at the end of their first session I had not received a mail message from one of the participants, I sent them a brief hello message with the reminder to send me a message at any time if they had needs or issues arising from the workshop.

Once a participant had completed the third module or indicated to me that they would not be completing the workshop, a final interview appointment was set up to take place in my office or another private location on campus. Whenever participants were not available for a face-to-face interview, arrangements were made for a mutually-convenient time for a telephone interview. As many participants were students in labour-intensive summer courses or preparing for their teaching practica at the time of final interviews, some were not able to find a convenient time for telephone interviews and preferred the option of e-mailing responses to interview questions. In all cases, final interviews involved an overview of the purpose of the interview (“First I’ll ask you some questions about your reactions to the workshop, then I’ll find out how you’re doing now with respect to math.”) then reminders to participants of the need for honest responses and that their names would not be linked to any quotations used. An interview guide

was followed for completion of the interview questions and responses from live interviews were recorded as accurately as possible by hand (see Appendix E and Data Gathering Instruments above). At the end of the interviews (and as a final question on the e-mail interview), participant needs for further counselling or math resources were assessed and appropriate referrals were made. Participants' remaining questions about the workshop content were also addressed at this time.

Rating, recording and data management procedures. At the completion of each of the three workshop modules, participants completed and submitted ratings and comments on the online session evaluation questionnaire. During each lab session, the scheduled RA made general observations of participants' behavior and apparent reactions to the workshop that day. Upon leaving, if the participant had not sought help, the RA checked in with them (e.g., "How did it go today – did you get everything to work alright?") and observed their mood state. RA observations for each participant included comments made, need for clarification, specific pages found particularly difficult or enjoyable, moods and state upon leaving. The RAs were made responsible for qualitative observations in the lab in order to ensure that participants would have only online contact with me during the sessions (i.e., to preserve the mostly online learning environment) and to provide more objective observational data. All RA observations were noted on recording log sheets (see Appendix K) along with the participant's session start and end time, starting and ending page number, next lab time and work submitted.

At the end of each lab day, hard copies of the workshop tracking information and all workshop submissions were printed remotely from the WebCT course management utilities and stored in my office. Verification of the online tracking records was also conducted weekly through comparisons with the RA recording logs and workshop appointment schedule. Finally, all quantitative data collected from preassessments, tracking records and session evaluations and qualitative data collected from within-session submissions and evaluation comments, e-mails,

bulletin board postings, RA notes, homework assignments, and final interviews were collated for each participant and used for the data analysis presented in the next chapter.

CHAPTER IV

RESULTS

This chapter is organized into two major sections representing the major foci of the study: Workshop Participation and Workshop Evaluation. The first section includes data concerning *participants, attendance* and *site use* analysis, i.e., who came for counselling, when they came, and how they used the workshop. In the second major section, two types of evaluative data are presented: *counselling outcome* or “effectiveness” data at both the overall workshop and individual session evaluation levels, and data collected regarding *reactions to online delivery*.

Workshop Participation

"If you build it, They will come" (or will they?)

Participants

As a result of recruitment efforts, 25 women who related to the term “math anxious” made contact through the Student Services office, expressing an interest in working on their math anxiety and requesting further information by phone. Of these, 16 eventually picked up an information and pre-assessment package and 9 indicated that they would be unable to attend a workshop (1 was now having success in her Statistics course and felt it was no longer needed, 3 were going to be too far from campus to come in to the lab sessions and 5 decided that they would be overburdened with other school-related commitments to complete a workshop at that time). One of the earliest respondents was permitted to begin early and thereby act as a pilot usability participant for the final “test run” of session 1 and data collection procedures. This was permitted as she was only available for a short period of time and wanted to include the experience in a pre-teaching self-reflection journal (a course requirement that term).

All 16 participants who had taken the information package eventually signed up for a specific lab time to begin the first session. Five of these individuals rescheduled repeatedly but never came to the lab for a session – two later contacted me to say they had changed their minds

about wanting to work on the issue at that time; the other three did not return calls or offer a reason for discontinuing contact. In addition to the pilot participant, 10 individuals submitted the pre-assessment data and completed at least one session. For the remainder of this chapter, unless noted otherwise, the presentation of results will be based on data collected from this group of 10 participants (A – J), and the pilot participant (P).

Participant general demographic information. All 11 workshop participants were females with ages ranging from 20 to 53 (mean and median age = 32 years). Nine participants were undergraduate students in the third or fourth year of their degree programs, majoring in Elementary Education (4), Secondary Education (3), Special Education (1), and Environmental Sciences (1). The remaining participants were: a graduate student completing an M.Ed. degree and a daycare worker with a two-year college diploma. All but one participant had completed the equivalent of Grade 11 mathematics, three had taken one further “practical” math course such as Consumer Math or Math for Teachers and two had completed an academic Grade 12 mathematics course. In terms of computer experience, 10 of the 11 participants were familiar with e-mail and the Internet and had been required to use computers as part of their university coursework. None had experienced an online course prior to the workshop.

Presenting complaints. Table 2 shows participants’ stated “target complaints” and discomfort ratings prior to beginning the online workshop. The major themes present in these complaints were: to overcome math-related *anxiety/fear/panic*: mentioned by six participants; to gain *confidence* with math: noted by five participants; to gain better *math understanding/basic skills*: needed by five participants; and to overcome math *avoidance*, gain a more *positive attitude* toward math and overcome *math test anxiety*: each mentioned by one participant (note that many participants named more than one complaint). The pre-counselling severity of participant complaints on a 13-point scale, ranged from a discomfort rating of 7 (“*pretty much*” bothered), to 13 (“*couldn't be worse*”). The mean complaint rating across all participants was 9.6 (“*very much*” bothered) ($SD = 2.02$).

Table 2 Participant Target Complaints

Participant	Target Complaints ^a and Discomfort Ratings
A	<ul style="list-style-type: none"> - Anxiety around simple math concepts - Overwhelmed by statistical concepts (7)^b
B	<ul style="list-style-type: none"> - I don't have some of the basic skills to help with higher math in other courses - To be able to relax so I can access some of the skills I have learned (7)
C	<ul style="list-style-type: none"> - I understand math (even my problem area, calculus) but when it comes to tests or exams I get in there and have never seen the material before. - I need to be able to write a math test/exam and pass. (12)
D	<ul style="list-style-type: none"> - I was good in it until grade 7 and then hated it ever afterward. I avoid using it <u>ever</u> because it makes me feel stupid. - To feel comfortable/confident with everyday math. (10)
E	<ul style="list-style-type: none"> - Not very confident with: algebra, geometry, statistics, some word problems, calculus (never done it) - To approach it <u>with confidence</u> and know the formulas to solve problems. (9)
F	<ul style="list-style-type: none"> - The anxiety of trying to teach something I don't always understand myself or have difficulty in explaining. (10)
G	<ul style="list-style-type: none"> - I need to get over my math fears so I can successfully complete my math courses and so I can become more confident with math in the future as a student teacher and teacher. (13)
H	<ul style="list-style-type: none"> - I'm not sure where I am with math. I am so uneducated in math, I don't even remember how to do fractions. (7)
I	<ul style="list-style-type: none"> - Confidence to enjoy teaching math and to know and understand what I am teaching. I want to be able to assist students to gain mathematical language competency which I must model. (9)
J	<ul style="list-style-type: none"> - I have a fear of it. I have always felt stupid and I want to overcome these feelings so I can go back to school and also live an easier life without worrying about Math. (11)
P	<ul style="list-style-type: none"> - I have never understood math and now when I see numbers and math, I panic without even trying to think the problem through. - I need to gain confidence in my basic math skills, and a positive attitude to at least some aspects of math. (10)

^a Written responses to initial student information questions: *What is your major concern in dealing with math (your reason for seeking help)? What do you need from this workshop?* The bold text has been added to allow the reader to more easily summarize the data and see similarities.

^b Discomfort rating using 13-point rating scale: 13 = "couldn't be worse", 10 = "very much", 7 = "pretty much", 4 = "a little", 1 = "not at all" bothered.

Expectations for counselling. A summary of all participant pre-assessment data is presented in Table 3. Adjacent to participant target complaints ratings (column 3) are participant ratings of the expected discomfort levels for their target complaints following counselling (column 4) – i.e., a rating reflecting to what extent they expected to be bothered by the target complaint, once they had completed the counselling. Expected post-workshop severity levels ranged from a low discomfort rating of 1 (“*not at all*” bothered) to a high of 9 (“*very much*” bothered), with a modal expected rating of 4 (“*a little*” bothered) ($M = 3.8, SD = 2.33$). This represents a mean expected decrease from pre-workshop levels of 5.6 points ($SD = 3.47$).

Mathematics Anxiety Rating Scale (MARS). Participants' total MARS scores are given in column 5 of Table 3. These scores ranged from 175 (“*a little*” math-related anxiety) to 398 (“*much*” anxiety) out of 490 possible points. The mean for this group was 277 points ($SD = 68.13$) which represents “*a fair amount*” of anxiety related to math.

Computer Thoughts Survey (CTS). The sixth and seventh columns of Table 3 list the results of the Computer Thoughts Survey: participant total survey scores are given in column 6 and scores for the Computer Enjoyment Subscale of the CTS are in column 7. Total scores for this sample ranged from 53 to 99 out of a possible 100 points, with higher scores indicating more positive computer-related thoughts. The mean score was 76.7 ($SD = 13.41$) indicating that, on average, this group felt positive about computers “*much*” of the time. On the Computer Enjoyment Subscale, the scores ranged from 8 to 20 out of 20 points with a mean score of 13 “*a fair amount*” enjoyed ($SD = 3.55$).

Participant summary. Eleven of the sixteen individuals who signed up to begin the online workshop actually participated, one starting early as a “pilot” participant. All of the participants were females between age 20 and 53, all but one were university (primarily Education) students with at least grade 11 mathematics and all but one had previous experience with computers. Prior to beginning the workshop, the participants' major concerns were: need to decrease math-related anxiety, build confidence with math and better understand and master the basics. The participants

Table 3 Participant Pre-Assessment Data Summary

Participant	Workshop Needs Summarized ^a	Complaint Rating Pre-Counselling ^b	Expected Post-Workshop Rating ^b	MARS Score ^c	Computer Thoughts ^d	Computer Enjoyment Scale
A	Decrease Anxiety	7	4	286	85	13
B	Decrease Anxiety Improve Basic Skills	7	4	227	64	10
C	Decrease Math Test Anxiety	12	5	185	99	20
D	Decrease Avoidance Gain Confidence	10	2	341	78	14
E	Gain Confidence	9	3	226	64	8
F	Decrease Anxiety Improve Understanding	10	?	285	87	17
73 G	Decrease Anxiety Gain Confidence	13	9	287	80	12
H	Improve Basic Skills	7	2	322	53	11
I	Gain Confidence Improve Understanding	9	4	175	86	15
J	Decrease Anxiety	11	1	398	66	9
P	Decrease Anxiety Improve Understanding Gain Confidence	10	?	315	82	14

^a Summarized from written responses to initial student information questions: *What is your major concern in dealing with math (your reason for seeking help)? What do you need from this workshop?*

^b 13-point rating scale: 13 = "couldn't be worse", 10 = "very much", 7 = "pretty much", 4 = "a little", 1 = "not at all" bothered

^c Higher scores indicate higher mathematics-related anxiety. (highest possible = 490)

^d Higher scores indicate more positive computer-related thoughts. (highest possible = 100)

were, in general, “*very much*” bothered by these complaints and expected that after the workshop they would continue to be “*a little*” bothered. On a standardized measure of mathematics anxiety, the MARS, all of the participants reported feeling at least “*a little*” anxiety in most math-related situations with the average being “*a fair amount*.” Their computer-related thoughts were generally positive “*much*” of the time and they reported enjoying computers “*a fair amount*.”

Attendance

(For this section, data from the pilot participant (P) is not included as she was not part of the online “group.”)

Lab attendance. Table 4 presents lab attendance data for the group of ten participants. Participants were permitted to choose and “book” any lab time in the week that best suited their schedule and as shown in Table 4, they made use of all of the scheduled lab times with the most popular lab times being Wednesday evening (12 log-ons) and Monday and Wednesday afternoons (5 log-ons). After having attended the lab at least twice, several students were having difficulty getting to the regular lab sessions. (Throughout the study, the participants needed to reschedule a total of 13 times and failed to show for their “booked” lab sessions 12 times without warning.) As they felt comfortable enough to “go it alone” without a research assistant present, they were given permission to visit the lab during times other than those regularly scheduled (Participant C took this option to complete) or to work on the workshop sessions whenever convenient from their home computers (participants A, B, F, G, I continued from home). Students were reminded that they should discontinue working if they experienced difficulties, and should contact the counsellor by telephone or e-mail to obtain help whenever necessary.

Workshop access. Table 5 gives a breakdown of specific workshop participation data for each participant. As shown in column 2, over the eight-week period during which the workshop was offered (May 17 – June 9) these participants completed on average, 2 1/2 of the three workshop sessions. One participant (G) withdrew after the first session and five of the ten (C, E, F, I and J) had completed the whole workshop by the end of the semester. Of those who failed to

Table 4 Lab Use and Log-on Times

Time of day	Number of Log-ons										Total
	Day of the week										
	Monday		Tuesday		Wednesday		Thursday		Friday		
	Lab^a	Home	Lab	Home	Lab	Home	Lab	Home	Lab	Home	
Morning	1		1	2	3	1			2	1	11
Afternoon	5	1			5	1			3	1	16
Evening					12						12
Total	6	1	1	2	20	2	0	0	5	2	39

^a bold text indicates regularly scheduled lab times

Table 5 Workshop Participation Data Summary

Participant	# Sessions Completed	# Labs Attended + Home log-ons ()	Mean # Minutes Per Lab/Log-On	# Emails: internal or external ()	# Bulletin Board Postings	# Input Boxes Completed	Homework Completed?
A	2.5	5 (1)	122.0	2 (2)	3	6/6 ^a = 100%	2/2 ^a = 100%
B	2	3 (0)	105.0	0	2	2/5 = 40%	1/2 = 50%
C	3	6 (0)	88.3	0	2	4/6 = 67%	3/3 = 100%
D	2	2 (1)	101.5	0	2	5/5 = 100%	0/2 = 0%
E	3	4 (0)	121.3	2 (1)	0	4/6 = 67%	3/3 = 100%
F	3	3 (2)	85.0	0	2	3/6 = 50%	0/3 = 0%
G	1	1 (1)	120.0	1 (1)	1	3/3 = 100%	0/1 = 0%
H	2	2 (0)	140.0	2	0	4/5 = 80%	0/2 = 0%
I	3	2 (2)	132.5	0	2	3/6 = 50%	2/3 = 67%
J	3	4 (0)	117.5	0	0	2/3 = 67%	2/3 = 67%
Mean	2.45 / 3	3.9	113.31	2.8 per emailer	2.0 per user	72.1%	48.4%

^a denominator indicates the number of input boxes or homework assignments the participant was exposed to in the sessions they completed

complete the workshop, one had to withdraw after session 2 due to serious illness, one experienced time constraints due to increased off-campus work responsibilities, and two had become “swamped” by summer coursework and visitors.

Column 3 of Table 5 shows that while working through the sessions, participants “logged on” to the online workshop a total of 39 times: some as little as twice and others as many as six times before termination, for an average of four times per person ($M = 3.9$). As shown in column 4, the average number of minutes participants spent each time they logged on ranged from 85 to 140 minutes, for an overall average of approximately two hours per log-on session (Grand $M = 113.31$).

Attendance summary. The ten participants completed on average, 2 1/2 of the three workshop sessions after logging on an average of four times over eight weeks and spending between 1 1/2 to 2 hours each time online. The most popular lab times were the one evening session (Wednesday) and the Monday and Wednesday afternoon sessions. Several students required additional time flexibility in order to continue with the workshop, one completing from the lab outside of regular lab times and five continuing when convenient from their home computers.

Site Use

(Again for this section, data from the pilot participant (P) is not included as she was not part of the online “group.”)

Anecdotal evidence provided by the research assistant logs indicates that for the most part, these participants worked through the online sessions in a page-by-page fashion. Upon returning for a second log-on session, they would resume where they had left off and in some cases would use the Table of Contents to explore the site more extensively. Both RAs noted that these participants seemed intent on completing as much of a session as possible while they were in the lab. They spent relatively little time reading information provided in links, preferring to print off longer readings and note URLs for use at another time. Students working from home

noted that they felt less pressured to complete a whole session in one sitting and did spend more time “playing” and “exploring.”

E-mail. Column 5 of Table 5 lists the number of e-mails sent by each participant while taking part in the workshop. Four out of ten participants used e-mail, sending at least two messages each for a total of 11 messages. All were sent to the counsellor (7 from within the online workshop messaging system and 4 from outside the workshop to the counsellor’s e-mail); 9 out of the 11 messages were unsolicited (i.e., initiated by the participant rather than sent as a reply to the counsellor’s message). No e-mail messages were sent between participants. All of the participants who used e-mail to contact the counsellor (A, E, G, H) were those who had a face-to-face counselling relationship with me prior to the workshop (personal, academic, career issues). The message topics included: help with a math question generated by the workshop (“*For a question like 7 divided by 9, when do you stop dividing?*”- Participant A) and reporting related feelings (“*This division and fractions is a lot of work. I’m freaking a bit. Lots of new words.*”- Participant A; “*I’m not doing at all well on the trial test of fractions*” – Participant E) (3 messages); scheduling (“*I was thinking about coming in on wed. instead of fri. this week*” – Participant E) (2 messages); request for the learning styles url (1 message); informing re: inability to complete a section due to lack of background (“*I don’t remember taking anything beyond fractions and decimals*” – Participant H) (1 message); informing re: success/difficulty with home access (“*At home, I’m getting a lot of error messages*” – Participant A) (2 messages); reply to a “welcome back” e-mail sent for session 2 by the counsellor (1 message); thanks for offering the workshop (1 message).

Bulletin board. Column 6 of Table 5 lists the number of bulletin board postings made by each participant during the workshop. Seven out of the group of ten participants made use of the bulletin board, making on average two posts each for a total of 14 posts. Of these, 13 were in response to requests by the counsellor as part of the workshop instructions (e.g., “*Try it now: send a brief introductory note to the group.*” or “*Here’s a discussion topic to get you started:*

What cultural influences do you think may have contributed to your math anxiety?"). None of the participants attempted to initiate a discussion on the bulletin board and only one participant (A) made a second post on the same topic, in response to one made by another participant (i.e., continuing the thread further). In addition to this follow-up post, a few other bulletin board entries referred to what others before had said on the given topic, indicating that the participants were reading the bulletin board responses of others (e.g., following the comment made by Participant A "*I feel resentful about it.*," Participant D's first post on the topic was "*I can appreciate the feelings of resentment.*"

Many of the bulletin board postings made by this group were lengthy, thoughtful, and personal, particularly when made in response to a stimulus such as an online reading (e.g., "*I can still feel now the confusion & shame I felt in adolescence about 'all of a sudden' not being good at math....*" [Participant C]; "*I also felt that since I didn't understand the topic I was the only one.... I think the article has validity*" [Participant F]. Only one participant in the group used an alias for bulletin board postings ("Ann Smith"); all others used their real names.

Within-session input boxes. In addition to online exercises and session evaluations, participants were invited to "participate" within each session, in response to questions posed, by typing their own answers into input boxes provided. Column 7 in Table 5 shows the number of input boxes completed by each participant. For each entry, the fraction given represents the number of input boxes completed (maximum 6), out of the number of input boxes given in all of the sessions completed by that participant (maximum 6). This group responded, on average, to most of the participation boxes they encountered ($M = 72.1\%$). Three participants completed all input boxes presented and all of the participants completed at least two. A review of the topics of input boxes more and less often filled in, suggests many participants were selective: they were more willing to complete responses on self-analysis topics (e.g., *my math skills summary* [80%]; *my self talk* [80%]; *my learning style* [80%]) than on more general topics (e.g., *how would you*

teach a panicked new driver to drive on ice? [40%]) or topics that might become public (e.g., write your own intro for the group [50%]).

Homework assignments. Column 8 in Table 5 indicates, for each participant, how many of the homework assignments that they encountered in the workshop were turned in for feedback from the counsellor. For each entry, the fraction given represents the number of assignments turned in (maximum 3), out of the number of assignments given in the sessions completed by that participant (maximum 3 – one from each session). Two of the group of ten participants completed all three homework assignments and four of the ten did not turn in homework. On average, these participants turned in half of the homework assignments they encountered ($M = 48.4\%$). From the content of the assignments submitted, the participants seem to have been able to engage in self-analysis and apply their online reading and experiences to their own math-related situations. For example, in thinking about her normal coping strategies used with success in other areas of life, one participant (C) wrote: *“I usually work them out by either talking or taking a walk and working them through step by step. I cope by thinking. I could use these strategies for math by taking a walking break and thinking through the math problem step by step.”* Another participant (A) concluded: *“In future, when I’m learning math skills, I’m going to write what I learn down here. [in her math journal] That would help boost my morale and give me an aid for facts or functions that “don’t stick.”* Through the homework assignments, participants also seemed to be able to express areas in which they needed more help. Participant E wrote: *“As for math exams I get pretty freaked out when I get stuck.... I try the deep breathing for calmness and clarity of thought. If I am able to get through I come out exhausted and with a sense of relief ... but a lot of disappointment that I did not do well.”* The written counsellor response for this statement was: *“Again, to stop this cycle, notice the negative things you say to yourself like ‘Oh no, I can’t figure this out. Time is running out.’ What could you say instead? - Let’s work on these together.”*

Site-use summary. For the most part, these participants worked through the workshop sessions page by page. If working in the lab, they often printed longer articles to read later and attempted to complete an entire session in one lab sitting. Electronic messaging (e-mail) was used only to e-mail the counsellor mostly regarding math and computer difficulties, math-related feelings and scheduling and only by the four participants who were previously acquainted with the counsellor. Seven participants used the bulletin board, posting thoughtful and personal comments and often acknowledging the posts of others, but only in response to workshop requests to give input on discussion topics; one participant chose to post under an alias. The group completed most of the question-and-answer “input boxes” presented in the sessions they encountered, particularly those relating to self-analysis. Application-type homework assignments were completed thoughtfully by six of the ten participants who submitted, on average, half of the assignments they encountered.

Workshop Evaluation

But will it work? ... and will they like it?

Counselling Outcome

Target Complaints. Participants’ post-workshop ratings of target complaints are presented in column 5 of Table 6 (previously presented initial complaints and expectations data are provided in columns 2, 3 and 4 and session completion data is repeated in column 5 for ease of pre-post workshop comparison). The actual post-counselling severity of target complaints ranged from a discomfort rating of 2 (*not at all* bothered) for participants A, B, D, H and I to 10 (*very much*) for Participant G. As Participant C had not yet had an opportunity to test whether there was improvement in her complaint of exam-related math anxiety, she was not able to offer a new rating, but did report that she felt increased confidence in math. The grand mean rating following counselling across all participants was 4.1 (*a little* bothered) ($SD = 2.02$). The mean decrease in severity ratings from pre-counselling levels was 5.6 points ($SD = 3.47$). This level is very similar to the average expected by participants at the outset of counselling (grand mean

Table 6 Participant Target Complaints Outcome Summary

Participant	Workshop Needs Summarized	Complaint Rating Pre-Counseling^a	Expected Post-Workshop Rating^a	Actual Post-Workshop Rating^a	# Sessions Completed
A	Decrease Anxiety	7	4	2	2 1/2
B	Decrease Anxiety	7	4	2	2
C	Improve Basic Skills Decrease Math Test Anxiety	12	5	?	3
				(haven't had a math exam yet but gained confidence)	
D	Decrease Avoidance Gain Confidence	10	2	2	2
E	Gain Confidence	9	3	6	3
F	Decrease Anxiety Improve Understanding	10	?	4	3
				(but new anxiety now – how to make math fun for her students)	
G	Decrease Anxiety Gain Confidence	13	9	10	1
H	Improve Basic Skills	7	2	2	2
I	Gain Confidence Improve Understanding	9	4	2	3
				(Note: gains also made from math methods course taken)	
J	Decrease Anxiety	11	1	7	3
P	Decrease Anxiety Improve Understanding Gain Confidence	10	?	4	1 1/2

^a 13-point rating scale: 13 = "couldn't be worse", 10 = "very much", 7 = "pretty much", 4 = "a little", 1 = "not at all" bothered

expected = 3.8, *a little* bothered). Most participants, then, reported an actual amelioration of pre-workshop math concerns with most gains shown by students who completed more than one workshop session: more specifically, a comparison of columns 4 and 5 of Table 6 shows that of those participants who were able to give expected and post-counselling complaints ratings, five improved to the level expected or beyond, and three improved, yet somewhat less than they expected.

Personal gains. In addition to final target complaints ratings, participant perceptions of overall workshop benefits (in their words, what was personally gained from the workshop) were collected through final interview responses and comments in homework assignments. Table 7 gives a compilation of these responses from all participants, along with a summary of the major themes in each response (given within square brackets). After completing all or a portion of the workshop, participants reported gaining: 1) *a more accurate assessment* of their math skills – a recognition of areas of strength and specific areas of weakness (9 participants); 2) *increased confidence* – a sense of hope that they can learn and improve in math (6 participants) or in using the computer (1 participant); 3) *normalized feelings* – a recognition and sense of relief that they are not the only one with this problem (6 participants); 4) *math learning strategies* – improved understanding of the best ways for them to approach and cope with math learning situations (5 participants). Other themes less often mentioned by participants were: *increased math knowledge* – refreshing, filling in, or building up weak math areas (3 participants); *understanding math-related feelings* – becoming more aware of their feelings around math and how they affect performance (2 participants); *less anxiety* – feeling less anxious in actual math situations (1 participant).

Session outcomes. Participant evaluations of sessions 1 to 3 of the workshop are presented in Tables 8 through 10. Each participant's session description ("*This session was*") and affect ("*Right now I feel*") ratings are given first, followed by their comments regarding the most valuable part of the session and recommended changes. A graphic representation of the ratings

Table 7 Participant Personal Gains Comments

Participant	Personal Gains-Related Comments ^a and Extracted Themes [] ^b	
A	Well, the initial information and de-stressing techniques were invaluable. I remember thinking. Gee, April has brought together the latest research in a very helpful manner. Besides the latest research being really kind, and absolutely right, such interest in us high anxiety types kind of “normalized” how I feel and behave. [<i>normalized feelings</i>] It was really healing. I mean some heavy personal stuff was going on for most people when they got turned off [of math]. So, the anxiety level I felt is way down. [<i>less anxiety</i>] ... But I am more empowered and more convinced that I can acquire that knowledge. [<i>increased confidence</i>] When I come to think of it, my earlier attempts to do something about my math and even the texts I’ve purchased just deal with math, not the feelings I let get in the way. So the content of this course made a big difference. [<i>understanding math-related feelings</i>]	
B	From the testing, I realized that I mostly make simple mistakes and just need to refresh and practice. [<i>more accurate assessment</i>] I’m planning on taking a math course through Grant McEwan [Community College] so it won’t count against my gpa. I’m ready now! [<i>increased confidence</i>]	
84	C	I learned what kind of learner I am. If I don’t understand, there are five different ways to do it [<i>math learning strategies</i>] -- AND that I’m not really that bad at math. [<i>increased confidence</i>] I always thought that I was just bad at math. [<i>more accurate assessment</i>] I learned I do have the staying potential. It’s not that it’s hard. [<i>increased confidence</i>] The learning styles information and the cartoons were really helpful. The cartoons I can really relate to and hearing about other people too helps you say, “OK, I’m not the only one.” [<i>normalized feelings</i>]
D	What I gained most from the workshop was a (surprising) revelation that, while math is not a “strength” for me, I’m probably not worse than average. In fact, since that workshop I’ve done some informal testing of myself in various situations, and it turns out I can estimate and add numbers in my head to a pretty good degree of accuracy. It was a pleasure to discover this and have evidence to oppose to my self-image as completely incapable in all things math. [<i>more accurate assessment; increased confidence</i>]	
E	What you do know about math. [<i>more accurate assessment</i>] I learned some new symbols, some algebra stuff and it helped me to call up old stuff. [<i>increased math knowledge</i>] I also learned what you apply to another subject, you can apply to math like making cards because I’m a visual learner. [<i>math learning strategies</i>]	
F These clips and tidbits also helped me to see that I was not the only one with these problems like I thought. [<i>normalized feelings</i>] As I am now entering my practicum I find that I still have some issues and anxiety about teaching math. I think that my main problem is not that I do not understand the material [<i>more accurate assessment</i>] but that I am unsure of how to make the lessons fun and interesting when I do not find the subject fun. [<i>understanding math-related feelings</i>]	
G	I decided to get a tutor to work with me one on one with my math. Through your workshop, I discovered that I have forgotten a lot! [<i>more accurate assessment</i>] It has helped but I did tend to drift, I think my learning really requires someone to be along side with me teaching it to me. [<i>math learning strategies</i>]	

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- G I decided to get a tutor to work with me one on one with my math. Through your workshop, I discovered that I have forgotten a lot! **[more accurate assessment]** It has helped but I did tend to drift, I think my learning really requires someone to be along side with me teaching it to me. **[math learning strategies]**
- H I learned that my basic math skills aren't as bad as I thought. **[more accurate assessment]** I also got better with the computer. **[increased confidence]** It felt better knowing that other people felt similarly. **[normalized feelings]**
- I I learned some new things – things I'd never been clear on. **[increased math knowledge]** It was helpful to see how other people felt. **[normalized feelings]** Their stories were very moving; there were parts of each one that you could relate to. I liked doing the math test; I wanted to evaluate myself so it was interesting to see where I was. **[more accurate assessment]** It was also helpful to see what kind of learner you are and the best strategies to use. **[math learning strategies]**
- J I felt more positive, more hopeful **[increased confidence]** (I need one of these sessions once a month – I tend to get excited, then it dies down). It was helpful learning how to cope and studying skills, **[math learning strategies]** especially realizing that it doesn't have to be drudgery but I can make it a lot of fun by making a beautiful learning environment, playing with felts I also learned some things I needed to work on like math terms, thousands, adding and dividing fractions and statements to talk yourself through it. **[increased math knowledge; math learning strategies]**
- P From doing module 1, and taking that math test, I realized that I struggle with the very basic concepts of math. **[more accurate assessment]** Therefore it is hard to build my math skills without a foundation. Knowing this, gave me a focus towards working through a basic math book and strengthening my math basics. This is important as I face my practicum and teaching future. This alone would give me more confidence. Another gain made from the workshop and the research you gave me, was that I understood for the first time that if I take some time to work with math and build my confidence, I could overcome my math weakness. In other words, this is not genetic!! **[increased confidence; normalized feelings]**
-

^a Comments made during final interviews and in homework assignments.

^b Bold text indicates a researcher summary of the major theme expressed within the comment.

Table 8 Session 1 Evaluations and Comments

Question	A	B	C	D	Participant ^a	F	H	I	J	P	Mean Rating
<i>This session was:</i>											
dangerous – safe (1) (5)	1 ^b	4	5	5	2	5	5	2	2	2	3.44
difficult – easy	1	3	3	3	2	3	4	1	2	2	2.44
worthless – valuable	4	5	4	5	4	5	5	5	4	4	4.56
<i>Right now I feel:</i>											
sad – happy	3	3	5	3	2	4	2	1	3	3	2.89
worthless – confident	2	3	5	3	2	4	3	2	3	3	3.00
detached – involved	2	4	5	3	2	4	5	4	4	4	3.67

^aParticipants E and G did not submit a session evaluation for session 1.

^bSession description ratings using each pair of descriptors (e.g., dangerous-safe) are made on a scale of 1 to 5, with 1 indicating feelings close to the left descriptor in each pair and 5 close to the descriptor on the right.

Participant	Session 1 Evaluation Comments: Most Valuable Part
A	Identifying which rules I had forgot. Reading the student and teacher histories.
B	I found out the areas in which I was weaker in so that I can concentrate on some of the basic skills. After this I might not get as frustrated if I have a greater knowledge base to work with.
C	Remembering little things that I have not taken for a long time. It made me feel good that I actually remembered how to do things, and get them right, when I used to fail them in an exam situation.
D	The evidence that math anxiety and inability is externally created, not a cognitive flaw or weakness on my part.
F	To assess where I need to improve on my skills and recall just how much of the information from school I did not retain. It also showed me that there were some strengths but that with a refresher that I would be able to succeed at the tasks more.
H	Probably realizing that I am not as useless with a computer or with math as I thought.
I	Reflection is useful. I have been doing quite a bit of it since January when I started taking Mathematics courses again. Even so, my reflections have gone through highs and lows. Sometimes I feel quite depressed, particularly when I think about how I feel I have failed my own child/ren. The personal math test was also good. It validates my reflections to show that the areas I still have trouble with were those which gave me trouble in the past.
J	I felt the information on recognizing your feelings and dealing with them was very helpful.
P	Understanding what areas of math I have the most trouble with. I have a clearer perception of how desperate my basic math skills are. This is scary considering I may be teaching these next year.

Participant ^a	Session 1 Evaluation Comments: Recommended Changes
A	Two of my answers were right, but were marked wrong. I thought it would be useful to be forwarned about the diagnostic test, but maybe not. Would like to know if there is follow up on the diagnostic test.
C	Everything was good. The examples from others are really good though. I personally always need to know that I am not the only one so it really helps to have concrete evidence that others are as math reluctant as I am.
D	Can't think of any - I like it.
H	Right now I'm not sure.
I	I tried to rush this too much. What I need to do is go back and add to my reflections. I will do this right now. I don't know how to change this feeling of urgency or "working quickly" when it comes to math.
J	I felt overwhelmed by all of this. Right now I cannot think of anything.
P	I thought it was an excellent first session. I am very curious about what the next two sessions are like and wha tuse is made of my scores and basic math skills to analyze me in the next sessions.

^a Participants B and F made no comment.

Table 9 Session 2 Evaluations and Comments

Question	Participant ^a										Mean Rating
	A	B	C	D	E	F	H	I	J		
<i>This session was:</i>											
dangerous – safe (1) (5)	5 ^b	4	5	5	4	5	5	5	4	4.67	
difficult – easy	5	4	5	5	3	4	5	5	4	4.44	
worthless – valuable	5	4	5	4	4	4	5	3	5	4.33	
<i>Right now I feel:</i>											
sad – happy	5	3	5	3	3	3	4	4	5	3.89	
worthless – confident	4	3	5	4	3	3	4	5	3	3.78	
detached – involved	5	4	5	3	3	3	5	3	4	3.89	

^aParticipant G and P did not submit a session evaluation for session 2.

^bSession description ratings using each pair of descriptors (e.g., dangerous-safe) are made on a scale of 1 to 5, with 1 indicating feelings close to the left descriptor in each pair and 5 close to the descriptor on the right.

Participant	Session 2 Evaluation Comments: Most Valuable Part
A	Focusing on self-talk highlighted the counterproductive things I said to myself today at work while doing a math-related task. The handouts are good. The crossword was fun. Liked trying to dredge up what I could remember about division. Going over the rules for division. Man, I can't believe I've suffered so long without this knowledge.
B	Getting done some of the specifics to make understanding math easier.
C	The most valuable part of this session for me was seeing that man in the video use his fingers to do multiplication. I have never seen that done before, but I really think it would have helped me out a lot when I was learning my times tables. I also learned that I am A tactile/kinesthetic learner, this would have helped me many years ago. I found this session very interesting.
D	Learning that I already employ a lot of useful tools for doing math. I've been using most of these ideas myself for some time, now, but always considered them ways of "cheating". I also really enjoyed learning some useful ways to PRESENT math, as I'll have to be helping my own kids with their homework someday.
E	I found that things I have learned before became familiar again.
F	the review of the terms and the descriptions about what each operation in math entailed eg what division was and how it could be done. the work sheets and resources were a good idea.
H	becoming more confident with the computer!
I	learning how to say 13.1 as thirteen and one tenth rather than thirteen point 1
J	the math studying strategies, the copying strategies, as well as the review on mathematical terms and math rules.

Participant ^a	Session 2 Evaluation Comments: Recommended Changes
A	Can you make the contents overview a little more visually appealing? Maybe some more interactive stuff on division. Maybe a self-test at the end and an assessment of which rules were used/forgotten.
C	This session should also have a quiz of some sort. It makes you think and remember the little things you have forgotten over the years. Everything else was thought provoking and interesting.
D	Nothing comes to mind, it was great.
E	I can't think of anything at the moment :)
F	A little too much reading, more exercises would be better. Some ideas on how to teach the material would be good.
I	get rid of the yellow printing - it is very difficult to read blue or green or red would be better--any dark colour

^a Participants B, H and J made no comment.

Table 10 Session 3 Evaluations and Comments

Question	Participant ^a				Mean Rating
	C	E	F	J	
<i>This session was:</i>					
dangerous – safe (1) (5)	5	3	5	5	4.50
difficult – easy	4	4	5	5	4.50
worthless – valuable	5	3	5	5	4.50
<i>Right now I feel:</i>					
sad – happy	5	3	4	5	4.25
worthless – confident	5	3	4	4	4.00
detached – involved	5	2	3	5	3.75

^aParticipants A, B, D, G, H, I and P did not submit a session evaluation for session 3.

^bSession description ratings using each pair of descriptors (e.g., dangerous-safe) are made on a scale of 1 to 5, with 1 indicating feelings close to the left descriptor in each pair and 5 close to the descriptor on the right.

Participant	Session 3 Evaluation Comments: Most Valuable Part
C	The symbols and summaries helped me a lot.
E	the review of the rules for the math steps and the helpful handouts that were able to be printed
F	when it listed the various types of learners and examples.
J	I felt most of the topics presented here was very valuable for me. I really like going over math terms again as well as techniques on how to prepare myself for math and math exams. I enjoyed the cartoons.

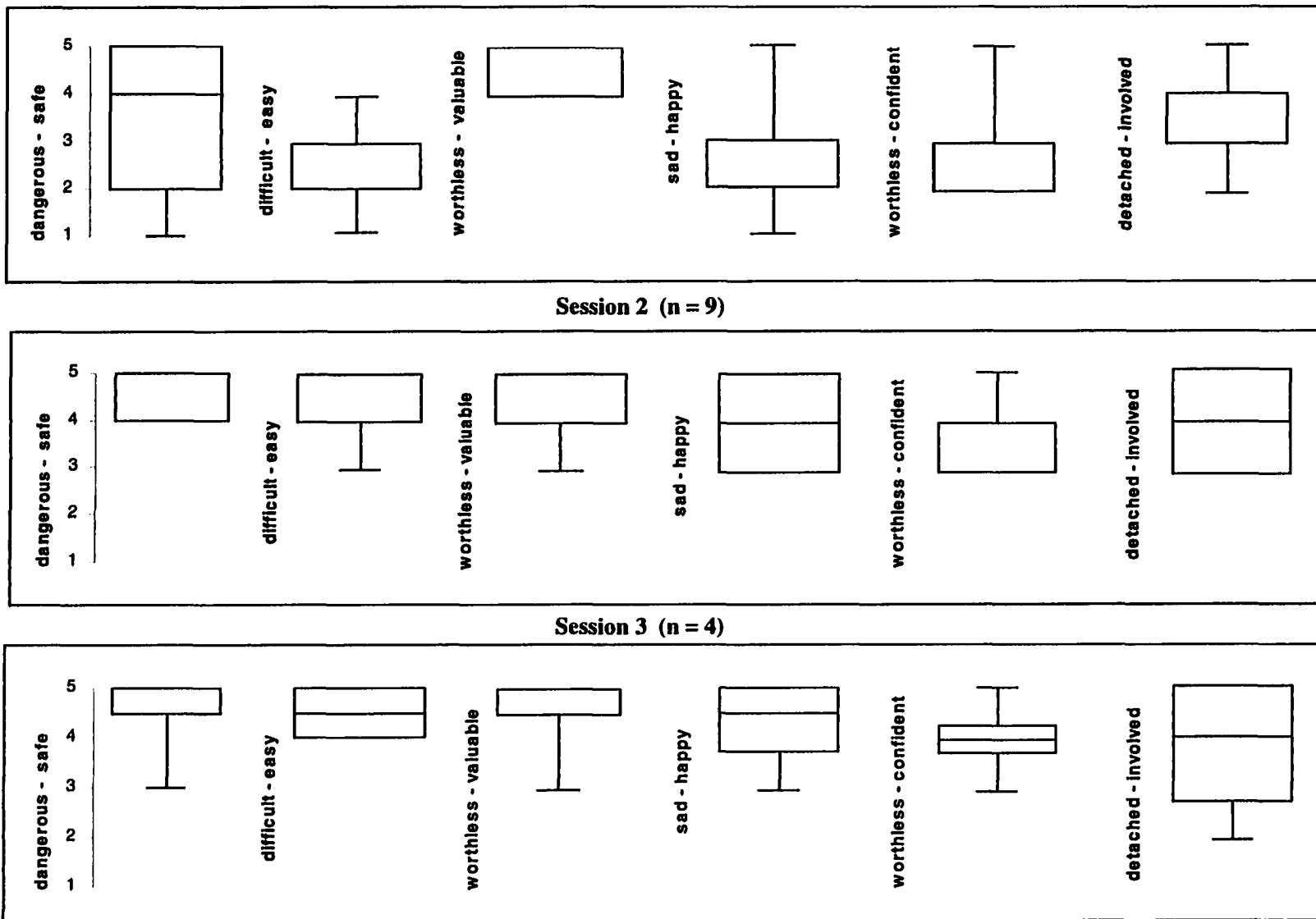
Participant ^a	Session 3 Evaluation Comments: Recommended Changes
E	there was too much text which became tiresome to read after a while.
F	the whole reading to the relaxation technique was too long and would have been more beneficial if it was in the form of a sounds bite so that the person could actually feel and do the relaxation technique suggested

^a Participants C and J made no comment.

for each session is also shown in Figure 10. Mean participant ratings based on nine evaluations, indicate that as a group, these individuals experienced session 1 as *somewhat* more *safe* than dangerous ($M = 3.4$), *somewhat difficult* rather than easy ($M = 2.4$), and quite *valuable* ($M = 4.6$). Participant ratings varied little regarding the depth or value of the session ($SD = 0.5$) as compared with the “safety” of the session for which the ratings varied widely from 1 “*dangerous*” to 5 “*safe*” ($SD = 1.7$). In terms of affect, following session 1, participants felt, on average, neither particularly happy nor sad ($M = 2.9$) nor worthless or confident ($M = 3.0$) and *somewhat* more *involved* than detached ($M = 3.7$). Following session 2, participant ratings were more positive and less variable ($SDs < 1.0$): session 2 was described as *safe* ($M = 4.7$), quite *easy* ($M = 4.4$) and quite *valuable* ($M = 4.3$); following the session, participants felt *somewhat happy*, *confident* and *involved* ($M = 3.9, 3.8$ and 3.9 respectively). Evaluations from the smaller group of participants completing session 3 ($n = 4$), were again mostly positive. They indicated that the session was *safe* ($M = 4.5$), *easy* ($M = 4.5$) and *valuable* ($M = 4.5$) and left them feeling *quite happy* ($M = 4.3$), *somewhat confident* ($M = 4.0$) and *somewhat involved* ($M = 3.8$), with the exception of participant (E) who gave more consistently neutral ratings than the others.

An examination of the participants’ evaluative comments following each session reveals that from session 1, they found the math assessment exercise and self-analysis most valuable (mentioned in 7 comments), along with the readings (2 comments). While Participant J reported feeling “overwhelmed” following this first session and Participant A felt unprepared for a “surprise” math assessment, most participants felt that there were no changes needed. Following session 2, participants commented that increased math knowledge from the basic math review (5 comments) and the math learning strategies presented (3 comments) were most valuable. In addition, they appreciated the handouts and style of math presentation (2 comments each) and mentioned that the video and “fun” exercises were effective. In this session, more changes were called for, specifically regarding interactivity (more exercises/quiz – 3 comments), visual

Figure 10 Session Evaluation Ratings Comparison



appearance of pages (2 comments) and less text to read (1 comment). Following session 3, participants again found the math review content (3 comments) and learning strategies presentations (2 comments) to be valuable. The handouts and fun (cartoons) were also mentioned again as appreciated. Changes called for in session 3 included less text (2 comments) and more audio (1 comment).

Reaction to Online Delivery

Participant reactions to the online delivery method used are described below. These summaries are based on final interview data from the eleven workshop participants (see Appendix L for Final Interview Responses) as well as comments made in Research Assistant logs, and participant e-mails to the counsellor.

Ease-of-use. The research assistant notes from participants' lab sessions indicate that, other than a few technical difficulties related to printing or multimedia operation, for the most part participants were able to work through the sessions without a lot of intervention. As one RA stated in her final comments on the workshop: *"a great many of the students just came in and sat down and said "Hi" but that would be it."* Initial session RA notes show that some minimal training was needed to get most participants started (e.g., for Participant F: *Her first session – gave an overview on how to use WebCT*). They also often required initial help with navigation problems: participants B and H, for example, had to be shown how to use the Table of Contents to reorient when they became "lost." Differences in computer experience were noted by RAs as a factor in the amount of initial and ongoing assistance that participants required. For example, the first session notes for Participant D included only: *"First session. Very familiar with PC, etc. Worked quietly and intently."* Similarly, regarding the most experienced participant, C, the RA reflected: *"She was very technologically apt and had no questions that I could recall. She seemed to "motor" through her assignments and sessions."* For other participants, the RAs commonly noted answering *a few technical questions* for sessions 1 and 2 and *no questions*

for session 3.

Throughout the sessions, the less experienced participants seemed at ease making use of the RAs' assistance when needed. Reflecting on her interactions with Participant A, for example, one RA concluded: *"From a technological point of view I don't believe that she was worried about her lack of skills - and having me there seemed to shift the responsibility of not knowing some things (but knowing enough to get around was a comfort)."* Those working from home on sessions 2 and 3 did not require any telephone assistance during the sessions and seemed comfortable handling any technical difficulties such as upgrading to the required browser version and dealing with slow downloading times, on their own. The one participant, I, who did experience difficulties using the workshop at home, acknowledged that these were caused by an inadequate monitor: *"I found working on my own computer frustrating, especially for session 3. The screen was too small so when there was a lot of reading, I had to scroll."*

Enjoyment. In their final evaluation comments, most of the eleven participants described mixed reactions to the online delivery format – some aspects were enjoyable, some were less so. Many enjoyed the novelty of the first session and reported to RAs that they found it "different," even "fun" at times with those most computer literate (C and D) showing the most initial enthusiasm for the delivery method. Even those who were less computer experienced reported that they were not "turned off" by the computer format: *"I was OK with it because I knew there was someone there to help"* (Participant J); *"I was comfortable clicking around the sites and stuff"* (Participant A). One of the least computer experienced (Participant H) made it clear to her RA that she enjoyed the first session and was looking forward to the next. Only one participant, G, who did not continue after the first session, admitted from this much exposure, that the format clearly did not suit her: *"I did lose track quite often because I felt like there was a bit too much to read. I guess you could say that I have a pretty low attention span when it comes to this kind of stuff. I think what would benefit me more is if I were actually in a class, or if it was a little more hands-on."*

While most participants were not uncomfortable completing a workshop via computer and were able to continue, several major issues related to degree of enjoyment or lack of enjoyment of the online mode were evident in final interview responses and RA notes. First, a perceived threat of lack of *privacy* regarding counselling issues and online submissions affected participants' comfort at times during the workshop. Participants A and J, for example, showed great concern in the first session regarding whether their "performance" in the online work would be seen by others. Referring to Participant J, the RA notes for her first session include: "*never used a computer before Very worried about who would see her results (very anxious).*" Similarly, Participant A was seen as: "*especially stressed while doing the self assessment.*" This participant later admitted her concern in an e-mail to the counsellor: "*Actually I don't mind submitting the test, as long as it is looked at. Also, the gentle appraisal at the end was helpful, because it sort of justified the diagnostic test. That would be good to know about before taking the test.*" These two participants (A and J) also rated session 1 as "*difficult*" and "*dangerous*" in contrast to their relatively "*safe*" and "*easy*" ratings of sessions 2 and 3. Felt anxiety over lack of privacy and possible humiliation was also noted by Participant J with regard to the "public" lab setting: "*Going to a lab was strange, wondering what people were thinking if I needed a lot of help.... She (the RA) also ... said the name of the workshop in front of everyone in the lab.*" Participant B reported a similar concern when referring to the "public" nature of posting to the group: "*I didn't find it hard to learn math using this method but I felt a bit scared to write much – once I wrote down a reaction but I didn't realize it was going to other people. What might be good would be to be able to post anonymously.*"

A second issue related to lack of enjoyment, raised repeatedly in summary comments and session evaluations, was discomfort related to *extensive reading on the computer*. Participant H's complaint: "*It was tiring reading at times,*" was typical. Some participants noted that they dealt with this issue by printing longer reading passages: "*I found it hard to concentrate on the computer so I liked to print off as much as possible*" (Participant E); "*At first it was all*

overwhelming: at the beginning I didn't realize I could print it all" (Participant J).

A third factor related to participant enjoyment was the amount of *interaction with others*. Some participants admitted that while it might have been easier to concentrate on the workshop from home, they enjoyed being with others taking the workshop in the lab setting: "*I felt rushed in the lab to complete a session. I think it would be more fun if I could do it at home. But I liked having another person there. I think I'd like to do it in a small class*" (Participant J); "*I liked the lab because of the other people – the first session especially. It's nice to come here*" (Participant C). This participant also commented, however, that she preferred working around other people but not being engaged in real-time discussions: "*After the first session it was easier to go in on my own. If they needed help, it wouldn't interrupt me. ... Other people talking a lot distracts me. This way you can pose your own question when you want to and anybody can answer.*" Others, in contrast, felt that the lack of discussion and immediate feedback made the workshop less enjoyable: "*It's better not having to worry about getting all the notes in class but not as good when you'd like to talk to a person*" (Participant E); "*For me, I like to interact more with other students. Although I don't say much, I enjoy listening to discussions*" (Participant H); "*I liked reading the bulletin board. I would have liked more*" (Participant D).

The most commonly and enthusiastically-cited factor related to participant enjoyment was the *self-paced scheduling* aspect of online delivery, particularly for those participants who eventually worked unsupervised (C) or from home (A, B, D, F, I): "*I liked it. I found it easy to work at your own pace – you could take your time with difficult things*" (Participant B); "*It suited me. I could work on it at odd hours*" (Participant I); "*It worked for me because you don't feel the pressure of being part of the institution. You can just go in on your own time.... I really enjoyed it because I felt like I accomplished something*" (Participant C). Similarly, a few participants appreciated the modular nature of the workshop: "*It was done in manageable chunks – nicely set out (for me)*" (Participant E); "*I found it easy to receive information in the format that you have presented*" (Participant F).

Multimedia effects. Participants expressed that the audio and video clips presented in the workshop sessions were, for the most part, a welcome and helpful addition: *“The sound bites and clips were an added bonus and broke up the monotony of just reading the text on the page. This is beneficial especially while working on a computer”* (Participant F). The effect of “breaking up the text” was not always seen as positive, however, as stated by Participant C: *“Sometimes with the audio you lose your place and continuity in the session.”* Although graphics, such as cartoons were mostly enjoyed, too many could be hindering: *“I found at times there were too many cartoons. They distracted me in the middle of a reading when I wanted to get to the meat of it”* (Participant D).

The following comment of Participant H was typical of the less computer experienced, who needed initial assistance with the operation of multimedia: *“At first I was worried about getting the audio and video to work but then I enjoyed it.”* Other participants indicated that the audio and video enhanced learning in that it served as a memory aid (*“I remember what I heard more so the audio gave two ways of remembering”* – Participant D), demonstration tool (*“I liked hearing your voice talking: it was very calming”* – Participant E) or through hearing and seeing other “real people” was particularly effective in normalizing feelings: *“... the little movie cuts – I could get right into those. They really brought a different thing into it. Like the finger math: You think, ‘It’s not just me if they brought that into a movie’”* (Participant C). The online interactive exercises such as the math self-assessment were also mentioned by several participants as being useful (e.g., *“The exercises were good; I wanted more of them”* – Participant E).

Communication modes. Other than the occasional desire, noted above, for more “live” interaction, the participants were generally satisfied with the available options for communicating with the counsellor and others in the group. In particular, all but one felt that they had adequate access to the counsellor; Participant J, who did not make use of e-mail, reported: *“I needed more sometimes, like when I was trying to do the exercises. Sometimes I wanted to talk after or during a session.”* All were satisfied communicating with others if desired through the

bulletin board and did not feel the need to e-mail other group members directly. Several participants noted that it would be uncomfortable for them to do so, particularly as they had not met face to face (e.g., *“If someone e-mailed me, I’d feel uncomfortable”* – Participant C; *“It would be easier to write if we’d met first and made eye contact: ‘Is this someone I can trust?’ I like to feel I can let down my guard a little. It happens with e-mail especially after time. I like to feel like I’m writing a letter to a friend then it’s fun without worrying about spelling or sounding witty”* – Participant E). Those who admitted to being hesitant in speaking out in class also expressed hesitance in posting to “strangers” on the bulletin board: *“I wouldn’t feel comfortable sending messages to the group. I like to listen to others. I don’t talk much in class.”* (Participant H); *“I guess I didn’t really want to. I take a while to warm up. It’s the same in class”* (Participant J). All participants were also agreed that for this type of workshop, they had no need for a “chat” option: *“For this, because it’s like a learning thing, I would find it distracting”* (Participant E); *“In this case I prefer the bulletin board. I want to reflect first, then respond”* (Participant D).

Perceived benefits. Reflecting on their experience, the participants perceived many potential benefits of this delivery format for a counselling workshop. Self-pacing or flexibility for attending and working on the content was again listed often as a major benefit, often along with access to “helpers” by e-mail as needed: *“You get to adjust to your own learning – there’s no conformity. No matter how old you are, if it doesn’t work right for you this way, you can always go back. You can send a question in and someone will help. It’s not like you’re left to your own devices like in a lecture. My math teacher teaches 300 people”* (Participant C); *“Flexible timing is a benefit, so is access to you and the lab assistant”* (Participant A); *“It’s good for people to do at home: you can stop and start when you want to”* (Participant E). Both the ability to control input and remain anonymous if desired were also seen as beneficial as compared with live counselling groups: *“I don’t think you feel like you’re on the spot. You’re free – if you want to answer you can but you don’t have to”* (Participant C); *“The main*

difference is that in a live group you don't take the responsibility as much. You can be a passive learner. Here the onus is on you -- you take the time to think about your responses...It's safer to be on my own" (Participant I); *"It's one-on-one. More private. I think for someone with a phobia to get started it would be better on a computer"* (Participant J).

Other perceived benefits related to electronic delivery included: remote availability for those outside the city, access to both print and electronic formats, electronic progress tracking or ability to resume "where you left off," quick access to additional information, interactive exercises with immediate feedback and clearly structured ("easy to follow") content. Finally, the electronic self-assessment capability of the online workshop was seen as potentially useful for counsellors in their ongoing work with clients: *"I think that the workshop online is an excellent tool that should continue to be used to give the counsellor background information"* (Participant P).

Perceived drawbacks. In addition to the need for access to a computer, these participants perceived issues such as difficulty remaining motivated and a possible need for more social contact and more of a forum for discussing arising counselling issues as potential drawbacks in delivering the counselling workshop online rather than in a "live group": *"It's faceless instruction so it's easy to not go if there's no one to answer to"* (Participant H); *"I know myself well enough that I'd prefer a classroom setting. The social reinforcement would have kept me coming to class"* (Participant A); *"A drawback was that there was no group to discuss issues as they came up and no feedback on any of the issues. It would be beneficial to talk to other people who may have the same feelings and anxieties as yourself. Finally if you were having a problem while doing the information on-line there was no one there to help you as there would have been if it was done as more of a counselling group"* (Participant F). In their consideration of the drawbacks of online-only delivery, more than one participant expressed a desire for an optimal blending of both the live and electronic counselling formats, and struggled to come up with a workable solution. The pilot participant (P), for example, suggested:

But I do feel that it should be used with a personal counselling session as well. A blend of the two counselling aspects would keep up motivation and give more of chance to discuss results and feelings/observations.... Having the option of completing the workshop via e-mail is a terrific solution to deal with scheduling problems. Then, brief discussion meetings could be scheduled for one or a small group after the person has completed one or two major segments. The meeting could be as brief as 15 – 30 minutes if the person was getting what they needed from the workshop.

Participant B suggested a similar combination approach as optimal: *“I found it easier to get to at home so I’d say, try to offer it that way if possible. But I know some people need to have a set class to go to, to keep on schedule. Maybe the best way to use it would be to have a regular drop-in class with a reference person so people could come in if they had trouble motivating themselves at home or needed help in certain areas.”*

Evaluation summary. Following the workshop, all but one participant who was not able to make a rating reported a decrease in the severity of their initial target complaints, with most gains shown by those who completed more than one session. Decreases were, on average, 5.6 points on the thirteen-point scale to the average level they had expected to attain (“a little” bothered). Personal gains reported from workshop participants included: *more accurate assessment of math skills, increased confidence, normalized feelings, knowledge of math learning strategies, increased math knowledge, understanding math-related feelings and less anxiety.* Average outcome ratings for the individual sessions indicate that participants similarly experienced all three sessions as *quite valuable* and left feeling *somewhat involved*. They varied in their experience of the safety and difficulty of session 1 which was on average rated as *somewhat safe* and *somewhat difficult*, while sessions 2 and 3 were more consistently found to be *safe* and *quite easy*. Similarly, participants were more positive following sessions 2 and 3, feeling *somewhat happy* and *confident*, than for session 1 after which they felt, on average, *neutral* in

terms of happiness and confidence. Participants found the math assessment and self-analysis aspects of session 1 most valuable along with the math review content and math learning strategies in sessions 2 and 3. Suggested changes for sessions 2 and 3 included increased interactivity and less text.

For the most part, participants found the online workshop easy to use and required little assistance from the RA other than a brief orientation to WebCT and help with navigation and technical operations (e.g., adjusting volume, printing) particularly during their first session and for those with less initial computer experience. Participants seemed at ease accessing help from the RA while in the lab and while working from home did not require any telephone assistance. With the exception of one participant who disliked the amount of reading required, initial reactions to the computer-delivery format were positive, particularly for those with more computer experience. Participants reported the self-paced scheduling as the most enjoyable aspect of online delivery while threat of lack of privacy, extensive reading on the computer and insufficient interaction with others were related to less ongoing enjoyment. The inclusion of online interactive exercises and cartoons was appreciated by participants as were the audio and video clips which were found to be helpful as a memory aid, demonstration tool or for showing the feelings of others. Although the participants wanted more interaction with others and more immediate interaction with the counsellor particularly while working through exercises, they were generally satisfied with the available online communication options. All participants preferred to use the bulletin board rather than person to person e-mail for communication with other group members, particularly as they had not met face to face, and had no need for an additional chat option. Those hesitant to speak out in a live class were also reluctant to post to the bulletin board. Perceived benefits of online delivery included: flexibility for attending and working on the content; access to content-related help via e-mail; ability to control amount of participation and degree of anonymity desired; remote availability; ability to print session contents; electronic progress tracking; quick access to additional information; interactive

exercises with immediate feedback; and structured, easy to follow content. Drawbacks perceived included: need for computer access; difficulty remaining motivated; need for more social contact; and more discussion and immediate feedback regarding arising counselling issues. Suggestions for an optimal blending of live and electronic delivery formats were also given.

Inferences that may be drawn from the results presented in this chapter will be discussed in Chapter 5, along with some tentative implications for best practice and further research needed.

CHAPTER V

DISCUSSION

A viable option?

The following discussion of the results of this research and development project is divided into five sections. First, the findings for each of the major evaluation variables (online workshop use, effectiveness and participant reaction) are interpreted with reference to the initial study objectives, results reported from previous studies, and related issues. This analysis is followed by an overall evaluation and discussion of possible implications of the online delivery experience. The methodological limitations of the study and suggestions for further research and practice are presented in the final section.

Use of the Online Workshop

A major objective of the current study was to investigate the way that participants made use of the “alternative delivery” workshop offered, in terms of their patterns of attendance and completion, and their use of specific workshop features.

Workshop Attendance

“... *you can stop and start when you want to.*” (Participant E)

As mentioned in Chapter 2, one of the challenges for online delivery of instruction, just as for home study offerings, is student attrition. In this study, the *recruitment results and pre-workshop attrition rate* found were not atypical, for on-campus math anxiety assistance: those responding to an offer of help were women at all stages in their pursuit of college and university education, particularly those concerned about having to deal with math in current courses or in the near future (e.g., for teaching or facing a math requirement that could no longer be put off); 9 out of 25 were unable to attend the online workshop, particularly on-campus weekly lab sessions due to other time commitments or physical distance from campus; and 1 of the 25 had found other methods for coping with her Statistics class. At the start of the workshop sessions, of the 16

individuals who signed up to begin, 5 repeatedly rescheduled and eventually either did not show or cancelled due to “a change of priorities.” This first session “no-show” or pre-dropout rate is higher than the typical rate (1 or 2 out of 20) seen for registrants in the live workshop and is likely due to one or a combination of factors commonly noted in the counselling literature: attendance was voluntary and no fee was charged for the workshop, resulting in a low initial commitment to start (“Something else came up”); fear or intense dislike of facing the math anxiety issue (“I’d rather avoid it”); and fear of the unknown (“I’m not sure if I want to go to a counselling workshop”). Additional factors that may have been operating in the case of online delivery include flexible scheduling (easy to postpone – “I can start next week” rather than “It’s now or never”) and a different fear of the unknown: working via computer. As none of these potential participants expressed particular concerns about the computer delivery when it was first proposed to them, and more than one admitted that it might be helpful for their computing skills, it is likely that the higher early attrition rate was due to the flexible start date, particularly during the summer (“I’d rather be outside”) term.

In this study, the participants’ *attendance at scheduled lab appointments and completion of the workshop sessions* was also unreliable. No-shows at labs were frequent, as were calls from participants needing to reschedule lab times. As participants were aware that the labs were ongoing and that there was no obligation to come at the same time each week, it is likely they felt that changes were easily accommodated. Also, as most participants attended consistently for their first two lab appointments, it is possible that lost momentum was a factor due to the lab closure three weeks into the study for midterm break: for many participants, particularly the four regular evening only students, attendance became sporadic after this point. While most managed to log on to the workshop for a couple of hours three or four times and completed at least two of the three sessions before the end of the eight-week offering period, only half of the participants completed the whole workshop. Again, this attrition rate is higher than that normally seen for the

face-to-face groups: for live workshops of several sessions' duration (e.g., three or more) some student attrition due to illness or increasing home or school commitments was also typical, but with only approximately 25% failing to complete. It is difficult to know whether the noted difficulty in attending and finishing was due to participants being "turned off" by the online delivery mode or by the increasing math content in sessions 2 and 3 (more thinking required), or whether they were just not motivated or having difficulty managing their time during a busy summer period. The evidence from participants' statements, suggests that the reasons may have been different for different participants. In the case of the one participant (G) who decided not to continue after working part way through session 2, it is likely that feeling personally unsuited to the online format, particularly when the math content was presented, caused her to feel unmotivated to continue (i.e., a "*this is becoming hard work*" response). For four others, "life happened" in terms of extra demands at work or school, children home from school, personal illness and long-term summer visitors, making time-management particularly difficult. The interview responses and session evaluations also suggest that the participants were enjoying the workshop but without the personal obligation and stimulation of a live class found it easy to "let it slide" (e.g., "*It's faceless instruction so it's easy to not go if there's no one to answer to*" [Participant H]; "*I know myself well enough that I'd prefer a classroom setting. The social reinforcement would have kept me coming to class*" [Participant A]). Similar difficulty with consistent attendance and completion of online courses has been well-documented in the literature. According to Mawhinney et al. (1999), who have offered online courses for several years, "there does seem to be a noticeably higher attrition rate in the online courses, particularly in electives where it can reach 50%." Kearsley, Lynch and Wizer (1995) have suggested that this frequently noted phenomenon "is probably more a characteristic of distance education than computer conferencing." Indeed, in a review of studies of persistence in distance education,

Cookson (1990) reported high dropout rates both prior to and during distance courses and noted the need to provide the option of more time for students having difficulty completing.

In the current study, *flexible scheduling* did not seem to improve attendance. While the online participants were given the freedom to choose one of seven lab times each week to attend, covering morning and afternoon three days per week, plus the most popular evening session, it was surprising to find that six of them still required further scheduling flexibility, preferring to continue during unscheduled lab times or from home. A two-hour lab session is still a large period of time away from home for many, so home access was desirable and in some cases essential for completion (e.g., with children at home and increasing class assignments, Participant I could only find time to work in the early morning hours on non-lab days). Other participants without access to home equipment suggested during interviews that they might have preferred to work from home, as at times they were uncomfortable working in the lab, yet they felt compelled to complete as much as possible while they were there. This was consistent with the experience of one of the RAs who has worked with several online lab courses and found that students often prefer to work from home on tasks for which they do not require a teaching assistant. The desire for home access was also strongly seen during recruitment for this study. As home access was not permitted at the start of the workshop in order to ensure that participants would be properly oriented and monitored, at least four potential participants wanting to work at a distance (one with a baby at home, two students who commuted long distances to attend classes and one mature student) had to be turned away.

Use of Online Workshop Features

"You're free – if you want to answer you can, but you don't have to." (Participant C)

In addition to the problem of sporadic attendance, as noted in Chapter 2, another ongoing challenge for online educators has been engaging the learners sufficiently to encourage completion of exercises and communication with others (i.e., how to arrange instructional

experiences so that the learners actively process the content and participate as they would in a classroom). In this study, the *site use* results suggest that the participants completed the workshop in a step-by-step fashion as intended (rather than skipping sections and jumping to pages of interest) and just as for their attendance, were generally selective in their *use of the various exercises* given. All participants completed the major within-session self-assessment exercises (e.g., basic math test and learning styles survey) as directed; session evaluation and interview comments suggest that they found them very interesting and helpful in self-analysis. Similarly, most participants completed and submitted the input or participation boxes related to self-analysis. This finding is not surprising as the topics of the self-assessment and analysis questions were presented as major content items and participants in the live workshop typically enjoy “analyzing” themselves. The online counselling literature also seems to confirm this result: it has been suggested that the online format is particularly suited to behavioral health and psychoeducational assessment (e.g., Reardon et al., 1984; Laszlo et al., 1999). The participants were somewhat more selective in completing exercises that may have been seen as less essential (e.g., thinking exercises such as *How would you teach a panicked new driver to drive on ice?*) or those involving a response that may become public (e.g., self introductions). Compared to the live classroom setting, with an authority figure watching participants respond and the peer pressure of others complying with requests, it may be easier for users to be selective in responding to exercises online. As this observation is only based on those exercises that were to be submitted, it is difficult to know whether the participants were equally selective with other thinking and practical exercises – e.g., when directed to “think” and record their own answer, did they do so before checking and moving on? (In the live classroom, the directive to “think” and “note your answer” is generally under the instructor’s control and therefore easier to monitor through the use of wait time until most have responded.) The number of homework exercises submitted also suggests that the participants were selective with the use of their time and energy. Only two

participants submitted all of the homework assignments, four chose not to complete any and most completed some portion. Comments made to me by a few participants during scheduling conversations suggest that they wanted to do the work but had trouble “getting to it” as an extra item in their schedule. As the assignments were voluntary (not graded or required for course credit) and perhaps somewhat unexpected from a workshop, this reaction is not surprising. The response rate found is typical for the live workshop as well, where many participants admit to doing “some” but have difficulty arranging the time to do all of the home practice and self-reflection exercises.

The participants in this study were also selective in their *use of the online communication options* when invited to interact with others. The option to e-mail the counsellor or to reply to messages sent from the counsellor was used infrequently and only by four of the participants who sent two to four messages each for the entire workshop from either the WebCT messaging system or their own e-mail accounts. No messages were sent between participants, as according to interview comments, this would have been uncomfortable, time consuming or redundant given the bulletin board option. The contents of messages to the counsellor were for the most part “formal” similar to those reported from detailed studies of online courses (e.g., Hara & Kling, 1999): course or content-related questions, reporting technical difficulties and expressing thanks. Only two of the messages referred to participants’ feelings related to math. Interestingly, although all but one of the participants were familiar with e-mail, this option was only used by those who had a prior face-to-face counselling relationship with me, rather than those who were more frequent e-mail users as might be expected. In fact, when asked about her satisfaction with the amount of counsellor contact, one of the least computer experienced replied: *“It was fine. I felt comfortable writing because I know you.”* It is possible that most participants felt little further need to communicate after “venting” their reactions to me through session evaluations and homework. This was somewhat confirmed in final interviews by the fact that participants

indicated they were mostly satisfied with the amount of counsellor contact. However, the one participant who had no prior experience with e-mail and did not make use of the messaging option recalled having the desire to “*talk during or after a session.*” While this participant (J) made use of the within-session input boxes as they were presented, regarding spontaneous use of other communication options she admitted, “*I didn’t really try them. I was afraid of doing it wrong.*”

The other communication option made available to participants, the bulletin board, was used more often by participants in this study but not frequently, and only when requested for specific topics as part of the workshop instructions. Seven of the ten participants in the online “group” made on average, two posts each to the bulletin board. From interview comments, it appears that these participants were enjoying reading each others’ posts, which were often personal and thoughtful, but for a variety of reasons, did not feel compelled to participate at length in the discussions. In addition to being inexperienced with the technology and therefore “*afraid*” to post as noted above, reasons given by the non-users included hurrying to complete the session (“*I wanted to get on with it*” [Participant E]) and preferring to “lurk”¹ rather than comment – a similar response style to their live class participation: “*Although I don’t say much, I enjoy listening to discussions.*” (Participant H); “*I take a while to warm up. It’s the same in class.*”(Participant J).

While timidity in initial participation is typical for workshops involving delicate or embarrassing topics such as the live math anxiety group (where individuals often need to be “called upon” to initiate discussion), several other factors affecting participation can be identified in this case: 1) no specific requirement or pressure to communicate; 2) concerns regarding communicating with “strangers” (“*It would be easier to write if we’d met first and made eye contact: ‘Is this someone I can trust?’*” [Participant E]); 3) lack of anonymity and experience in

¹ To “lurk” is to be present but as an unknown, passive observer of the group’s intercommunication.

posting to the bulletin board (*"I felt a bit scared to write much – once I wrote down a reaction but I didn't realize it was going to other people. What might be good would be to be able to post anonymously"* [Participant B]); and 4) little time to "bond" and consider themselves a group due to the short duration of the workshop. In later sessions, it is also possible that most participants were involved with the math and after venting in the first session, felt less need to discuss their experiences.

Several of the possible factors inhibiting participation mentioned above have been noted in previous anecdotal and research reports from online educators. As indicated in Chapter 2, the reporting of little interaction between participants is typical for online courses where no particular efforts to encourage participation have been employed. According to researcher Murray Goldberg's (1999) newsletter of online learning: "... getting students to participate spontaneously in their own active learning process often takes some added work – and ingenuity." In the current study, while the online instructions directed students to post their opinions and counsellor followups were posted when appropriate, no other specific interventions were used to increase participation. Reports of success stories from instructors attempting to decrease affective barriers online have included the greater use of pseudonyms to promote "faceless" and therefore risk-free discussions and pre-course training sessions where students can familiarize themselves with online tools (Goldberg, 1999). These factors have also been noted as important in CMC research: Jaffe, Lee, Huang and Oshagan (1995) for example, reported that both the use of pseudonyms and participant familiarity with computer-mediated communication affected the volume of discourse in computer conferencing. In the current study, other than the one participant who requested a pseudonymous ID, it is likely that given their little experience and training with online communication, the others were unaware of the value of using pseudonyms when the option was presented.

Within the very recent and limited literature on online psychoeducational interventions as well, between-participant communication has been mentioned as a focus for improved future development. In their study of an online support group for eating disorders, for example, Winzelberg and Taylor (in press, cited in King & Moreggi, 1998) found that while participants disclosed concerns, the number of supportive messages directed at other participants was low. Among their plans for further study was use of a more active moderator who would specifically encourage sharing and feedback among participants. Similarly, from a presentation regarding the Career HOPES online career development intervention, among the “lessons learned” listed by Herman (1999) are the need to “use contingencies to encourage participation” and the observation that “initial in-person meeting builds cohesiveness.” In contrast, it is interesting to note that in the literature on online support groups (where face-to-face meetings do not generally take place), participation difficulties are not mentioned. Perhaps the difference compared to short-term online interventions lies in longer time spent as a “group” and participant expectation that they are going to take part in a discussion and sharing group as the main vehicle for support and learning.

Effectiveness of Online Delivery

A second major study focus was the analysis of user reports of counselling outcomes achieved from participating in the online workshop, to assess its effectiveness in terms of helpfulness and promotion of change.

Measured Change

The initial target complaints or reasons for wanting help given by participants prior to the online workshop were very similar to those given by participants in the live workshops (most commonly: to *decrease math-related fears*, *gain confidence with math* and *gain better math understanding/basic skills*). The range and average severity level of these complaints from “*pretty much*” bothered to “*couldn't be worse*” with an average discomfort level of “*very much*” bothered was also typical of the initial state of participants in the live group. At the time of final

evaluations, other than one participant who was not able to make a rating (she had not yet been able to evaluate her specific fear of math tests), all of the participants in the online group reported improvement in their pre-workshop math concerns, with the average dropping to “*a little*” bothered. Not surprisingly, those still feeling a moderate level of discomfort were the two who least enjoyed computers as shown in their initial computer enjoyment subscale scores (E and J – see Table 3). The highest post-workshop discomfort rating (a decrease from “couldn't be worse” to still “very much” anxious) was given by the participant (G) who only completed one session. Again, although actual pre/post target complaints ratings have not been collected previously, the general level of improvement seems similar to that reported by live workshop participants: those who stay longer than one session (to face more of the math content), generally report feeling “*much better*” about math on their final paper-and-pencil workshop evaluations. This finding then provides further support to the frequent contention, noted in Chapter 2, that online delivery of instruction is overall “as effective” as live delivery. It is also interesting to note that participant expectations of the effectiveness of the workshop were, in general, fulfilled: the average final level of discomfort reported by the online group (“*a little*” bothered) was generally as they had expected prior to the workshop. Efficacy expectations were even high for the two participants with the lowest computer enjoyment scores but not for the one participant (G) who withdrew early. It is difficult to know whether this positive outcome was expected by most, due to perceived efficacy of computer-based interventions or counselling workshops in general. As Participant G had the highest initial discomfort rating “*couldn't be worse*”, it is possible that she felt a moderate improvement was the most realistic outcome for a short-term workshop. The fact that she did report personal gains, a lower target complaints rating and a willingness to seek tutoring after just one session is notable and suggests that just completing one session can be useful for extremely anxious individuals.

Session Evaluations

From the participants' consistently positive online evaluations of individual sessions, where the average "value" rating was 4.3 to 4.6 out of 5, it is clear they felt unanimously that the workshop was valuable. Their comments regarding overall workshop value also support these ratings ("*Overall it was very good.*" [Participant B]; "*I think it would be really helpful.*" [Participant C]; "*It's worthwhile.*" [Participant E]; "*I really could have used this when I first started back.*" [Participant I]). Again, this participant evaluation is similar to those given at the end of the live workshop for which overall ratings average 9 out of 10 where 1-2 is "*poor*" and 9-10 is "*excellent*". Participant evaluative comments regarding the "most valuable part" of each session (*math assessment exercise, self-analysis, basic math terms and steps review, and math learning strategies/learning styles information*) indicate that many of the major topic presentations and exercises were effective. The straightforward style of math presentation as well as readings, handouts, inclusion of video and "fun" exercises were also mentioned as helpful, suggesting that the variety in presentation media may have enhanced the effectiveness of the online instruction for many participants.

A major unknown regarding the alternative delivery was whether the simulated online workshop experiences would evoke the kinds of emotional impacts necessary for change. From participant session evaluations and homework assignments, it is evident that they felt engaged by each of the sessions (left feeling somewhat "*involved*" rather than "*detached*") and as hoped, became happier and more confident in later sessions. As in the live workshop, session I seems to have been the most emotionally evocative and challenging for participants, who reported feeling "*moved*" and "*relieved*" by the stories of other math-anxious individuals, "*sad*" or "*resentful*" of their own math past and anxious at the challenge of a basic math assessment. It was essential from a support standpoint to have a gauge of participants' ongoing affective responses from within-session input boxes and session evaluations – even if they didn't contact me, I could

comment on and normalize these feelings for them in a message or by phone when telephone contact was needed to reschedule an appointment. While there were no apparent emotional crises triggered by the experience, the effect of the initial math assessment was surprisingly strong for at least two of the participants – one with the most post-secondary education and one with the least – who both rated session 1 as "*difficult*" and "*dangerous*." As a result of witnessing these reactions, in her final notes regarding the workshop, the RA stated: "... *anxious would not be the appropriate term for some of these people. Deathly afraid would be better!*" As I had underestimated the need to prepare students for this exercise, as a result of their reactions, the instructions for the math assessment have been changed to emphasize the fact that it is for the user's diagnostic use only and scores are not submitted to anyone by the program. This experience also underscores the importance of providing support avenues through e-mail or telephone to help users process strong responses.

Personal Gains

"My new found awareness has gone a long way towards breaking down my fear and understanding what I need to improve." (Participant P)

The main themes in overall personal gains reported by online participants following the workshop (*more accurate assessment of math skills strengths and weaknesses, increased confidence, normalized feelings, knowledge of math learning strategies and basic math*) were again very similar to those commonly reported by live workshop participants who have made comments such as: "*I found out that when confronted with math I really do know a lot.*" or "*Not only did I conquer my fear but I learned many of the basic skills of mathematics as well.*" As these themes closely relate to the objectives of the workshop (see Chapter 3 – Workshop Design), it is clear that the workshop in online delivery format was similarly successful in promoting desired change. Interestingly, although they did not have much contact with their online "group", participants frequently noted that a major gain was learning they were not alone in struggling with math fears ("*[the latest research]... 'normalized' how I feel and behave. It was really*

healing" [Participant A]; "*It was helpful to see how other people felt.*" [Participant I]). The bulletin board postings, although infrequent, also showed that they were identifying with each other – similar to discussions in the live group. An emphasis on the stories and experiences of others was built in because of concerns that this goal would not be met without participation in a live group. It appears that this strategy was successful. Participants were also particularly pleased with being able to assess their current math skills. This exercise seems to have been even more effective than in the live workshop where the math assessment is analyzed in class but given for homework and not always completed adequately (in the online workshop they were obliged to complete it and analyze their performance before moving on). This result again suggests that computer delivery may be particularly suitable for psychoeducational assessment.

Participant Reaction

A third objective for the study was to investigate individual reactions to the online delivery format, to determine whether it was easy and enjoyable to use.

"User-friendliness"

In planning the study, I was unsure how well math anxious learners would fare in a workshop delivered via computer (a typical comment voiced in response to the proposal of an online workshop for math anxiety was: "*But wouldn't math anxious people be afraid of using computers?!"*). The self-report and observational evidence suggests that the participants in this study found the online delivery system easy to learn and use. While the RAs noted individual differences, particularly in the fact that inexperienced computer users required more training and initial assistance as compared with experienced users, interestingly, the one student who dropped out early, did so due to difficulties with the self-study aspect ("*I did tend to drift*" [Participant G]) rather than computer difficulties. It is likely that several factors contributed to this outcome: 1) *adequate support during training*: having the workshop delivered initially in a monitored lab setting with an assistant present allowed participants to learn the WebCT system in a relatively

safe environment; 2) *adequate ongoing support*: although few difficulties were encountered in later sessions, having the lab assistant available for less experienced participants provided a comforting safety net ("I liked having another person there." [Participant J]); 3) *user analysis*: taking the extra time to analyze likely user characteristics (in this case, low computer skills, low tolerance for frustration, moderate anxiety) and modify delivery accordingly (e.g., limiting amount of navigation required); 4) *usability testing*: taking the time to conduct usability tests and modify instructions to lessen potential user difficulties; and 5) *appropriate platform*: delivering the workshop via a delivery system known to be appropriate and user-friendly for likely clients (e.g., WebCT for adults). Although the workshop in its current state was quite user-friendly, there seems to be some room for improvement in terms of anticipating initial navigational problems, particularly during use of multimedia options that take users off of the familiar page layout. As noted above, there is also further need for better training in the use of communication tools as inexperienced participants may prefer to avoid the technology and therefore not participate. From the suggestions for change offered by participants, it appears that the workshop could also be improved in terms of user-friendliness by reducing the amount of text and length of individual sessions in order to avoid undue user fatigue.

As suggested above, frustration over difficulties in using the computer was not apparent in this study as it has been in other reports of student reactions to online course delivery (e.g., Hara & Kling, 1999). The only hindering emotional reaction evident was self-consciousness and concern over the possibility of embarrassment – some participants were particularly hesitant to post to the bulletin board and some were concerned about the public nature of the lab (as others might hear that the workshop was for "math anxious" people, the RA would see what they were printing or that they did not finish the math test, or someone might be looking over their shoulder). Therefore, it seems important that if online counselling workshops are completed on

campus, a partitioned space should be made available and assistants alerted to the need to give users privacy until called upon to assist.

User Enjoyment

Although considerable effort was put into the design of the workshop to include interesting content and interactivity, another unknown at the outset of this study was the degree to which users, particularly those who were inexperienced with computers, would enjoy attending a counselling workshop online. Not surprisingly, as is typical for online courses, some aspects of the online delivery were enjoyable for users while others were not. All participants in this study seemed to enjoy the novelty of the multimedia and interactive exercises, particularly after those who were least experienced and enthused about computers overcame their concerns about using the technology. (This finding supports previous conclusions regarding the high interest level generated in users of CAI applications for counselling, e.g., Cairo, 1983). While there were differences of opinion in terms of the optimal amount of graphics and audio clips interspersed with text (some preferring fewer, so as not to break concentration), for the most part these features, in addition to being helpful, contributed to the enjoyment of the workshop. The considerable time and effort involved in building in interaction and multimedia then seems to have been worthwhile. This finding also supports more of the "lessons learned" from the Career HOPES online career intervention reported by Herman (1999) who suggested the need for "*shorter, more interactive lessons*" perhaps involving multimedia. Again for the online workshop, the ability to self-pace in terms of learning and scheduling was the most frequently mentioned enjoyable aspect of online delivery ("*I found it easy to work at your own pace – you could take your time with difficult things.*" [Participant B]). This is again consistent with other studies of student opinion regarding online delivery (e.g., Ross, 1999). Variables that negatively affected enjoyment, in addition to the concerns regarding privacy noted above, were the common online learning complaints of amount of reading required for larger text sections and inadequate

interaction with others. Individual differences, however, were apparent: while a few participants desired more interactivity and less text, others were content to resolve the issue by printing the text to read later or working through the content in shorter online sessions from home computers; similarly some participants desired more direct, in-person interaction with others for discussion and motivation while others enjoyed the asynchronous interaction as it allowed better concentration and time for reflection and composition of responses. Interestingly, the fact that many students also suggested specific ways to resolve their need for interaction, with solutions ranging from a regular weekly drop-in sessions to meeting over coffee after the final session, suggests that they had felt the desire for such contact during the study.

Overall, while the participants in this study generally enjoyed the workshop, the degree of enthusiasm for the online delivery format varied. Most expressed either a somewhat positive reaction (e.g., "*It was different. I still like one-on-one but it was doable -- you could work at your own pace*" [Participant E]), or a highly positive reaction – for some, the self-pacing and control over interaction made this option not just "doable" but preferable (e.g., "*This was absolutely wonderful*" [Participant B]; "*It suited me. I could work on it at odd hours*" [Participant I]; "*You don't have the outward distractions.*" [Participant C]). This result was surprising to me but consistent with what other instructors teaching parallel face-to-face and online courses have found. For example, after three years of comparison in delivering business courses, Mawhinney et al. (1999) noted: "The informal feedback from the students we have had indicates that it is the greatest thing since sliced bread for those for whom it works." Looking at the characteristics of individual participants in the current study, it appears that this format was most enjoyable for those who had very busy schedules, were not inexperienced with computers and were more mature or independent as learners (i.e., not highly needy for immediate input and feedback, like to control their own learning and do not require the live interaction to keep them motivated). In contrast, the one student who felt clearly unsuited to this method was still at an early stage in her

education and admitted to being undisciplined with independent learning that required reading. The finding that mature, independent learners were enthusiastic about online delivery supports previous conclusions that self-regulation is a major requirement for success in distance education (e.g., Abrahamson, 1998; Cravener & Michael, 1998) and that computer delivery works particularly well for graduate level education (Kearsley, Lynch & Wizer, 1995).

Overall Evaluation of Online Delivery and Study Implications

The effectiveness results from this "test drive" suggest that despite the transfer of the counselling workshop from the live to virtual setting, the online version "worked" successfully as a math anxiety reduction and math study skills workshop. Some noticeable "gains and losses" (Walz, 1984) however, for both the participants and myself as the counsellor, may be identified. From a participant perspective, while the online version was considered valuable and enjoyable enough to be "doable" for all but one participant and even preferable for some, without the pressure of expected attendance at a regular class, in the end, many of the online participants struggled to complete it. Therefore it will be necessary in future to address ways to better encourage persistence (see practice recommendations below). A comparison of the online participant final evaluations with those collected from live workshop attendees ("*aspects of the workshop that were helpful for me, or that I liked*") also reveals another loss from the translation. Although both groups appreciated the math anxiety and study skills content, clear math presentations and handouts, the live class participants have consistently emphasized the positive classroom environment, naming the "*informal atmosphere*", "*friendliness of the teacher*" or "*non-confrontational teaching*" as most beneficial. The online participants however, did not comment on having an experience of "friendly" instruction. They instead particularly appreciated the opportunity to work following their own schedule and to take more time in understanding the math. Interestingly, in final evaluations, the live workshop participants having limited class time often wanted more time on the math (more sessions) and more structured practice, while the

online participants often missed the stimulation and assistance of the classroom interaction with others (*"It's better not having to worry about getting all the notes in class, but not as good when you want to talk to a person."* [Participant E]). Therefore, it seems that each version comes with trade-offs: it is difficult to offer enough of both stimulating interaction and time for complete understanding of all topics within one delivery format. It is also interesting that both participant groups seem to have particularly appreciated workshop aspects that they felt were different and better than the usual, anxiety-provoking math classroom experience. This dissonant experience of math learning (as noted in the live group: *"the first Humanistic math instructor I've ever encountered"* and in the online group: *"for some of that stuff, I could get it for the first time in my life"* [Participant C]) was an important ingredient in both settings for overcoming learned helplessness and beginning to associate new calmer, more hopeful feelings with math (desensitization).

Overall then, while the friendly environment did not translate as well as I would have liked, the goal of creating a successful, low stress math learning experience seems to have been achieved through gains from the online medium: more time on task and self-paced instruction. Another concern in losing the classroom interaction is that the online participants would not have sufficient opportunities to analyze their actual math class reactions and to apply new coping and study skills during a class. While both the online and live workshop participants are encouraged to face math and apply skills in everyday life, in the live class students are encouraged to notice and process anxiety responses, ask "dumb" questions, and try out math learning strategies (e.g., note-taking methods) during the math presentations. Since many of the online participants indicated that they felt ready to try a math course, the virtual math class may have served as a good stepping stone, however it did not provide direct practice in dealing with live math instruction. As this may be an important limitation affecting transfer of skills, another area for future improvement is building in opportunities for vicarious learning of application (e.g.,

perhaps have online students watch videos of live interactions where the counsellor is demonstrating with individuals when to apply coping or study skills during math instruction).

From the limited amount of communication between participants in this trial, it appears that the workshop operated like an online course with the standard difficulties in encouraging participation. It is interesting that many experienced a “peer group” effect through the readings, multimedia and bulletin board but wanted more interaction with their online group. As the supportive communication aspect of the live workshop experience (e.g., “me too” or “what works for me” statements) was only slightly evident in the online version, this will be a further area to target for improvement. Similarly, although the goal was to simulate ongoing counsellor support during learning, while the many contact options were a comfort for some participants, this aspect also seems to have suffered in the translation for others who noted that at times they felt they needed support but didn't make contact. Better orientation to e-mail and the counsellor as well as clarification of how e-mail communication can be beneficial (i.e., suggest how often and for what reasons participants might e-mail) will likely improve this aspect of the workshop. It should also be noted, however, that in comparison to the reality of the usual time-limited one-to-many interactions between counsellor and students in the live workshop, the online medium has the potential to offer clients more indepth assessment and more personalized, one-to-one feedback and assistance from the counsellor – a major gain.

For myself acting as the counsellor, there were also significant gains and losses in the translation from counselling live to online. The most obvious gain was in being able to offer instruction and support to those who required distance delivery and having the flexibility to meet their changing needs for taking the workshop from home or starting at a later date. As one participant was recruited by word of mouth, it was very satisfying to be able to accommodate her in the same group with her friend. This often happened with the live workshop but late starts were discouraged as new students would have missed essential content and experiences from earlier

sessions and classes were often full. A similar benefit for the counsellor is that the online materials may also prove useful as a good backup to live sessions for those who've missed or desire more time on the content. While the flexibility of the workshop was useful, it was also uncomfortable at times. As most participants took control of their learning and "did it their way" – i.e., took advantage of the time flexibility and opportunity to participate selectively in exercises and discussion – it was difficult at times to gauge their progress and needs. The loss of the normal visual cues present in the live workshop for being able to "read" client emotions and needs (e.g., "*many of you are looking hesitant about that exercise ...* ") was a definite drawback particularly in attempting to work with participants who did not submit homework assignments or attend labs, as it was frustrating not knowing whether the participants needed support. As the online session evaluations offered an opportunity to check participant affective reactions, needs and enjoyment of the workshop, the use of some similar brief and frequent mechanisms for maintaining counsellor-client communication with all participants will be important in future development.

Finally, the experience of delivering and monitoring the online math anxiety workshop both on and off campus has provided some indication of how it might best be managed in future². As home access was desired by many of the initial recruits and participants in this study and experienced computer users seemed to have little difficulty in managing the workshop on their own, it seems that offering home access following a (live or telephone) meeting with the counsellor and orientation to the system (conducted by a counselling assistant, receptionist, librarian, peer helper or telephone support person) would be possible for those who feel comfortable handling their own equipment. For those without computer access at home and less comfort with computer systems, the workshop could be offered by appointment through a counselling centre, regional education centre or library computer station following a meeting with the counsellor and orientation, provided that the location offered sufficient privacy and someone

² See also "Practice recommendations" below for more general online intervention recommendations.

to provide technical assistance as needed. While hybrid live and online approaches seem to be optimal, they would likely be impractical due to the difficulty of finding meeting times to suit all participants. One alternative may be for counsellors to offer an orientation session and mini-discussion at several times (some daytime, some evening) during the semester for those interested in attending a workshop, then allow students to branch into live or online groups as fits their schedule and preferences. In addition, portions or all of the online workshop could be quite useful as an adjunct or precursor to live classroom instruction in classes or centers where math anxious students tend to be found and where the instructors/counsellors need resources for dealing with this issue (e.g., classes: math for teachers, developmental math, statistics, research methods; centers: learning assistance, aboriginal student services, mature students support).

Study Limitations and Recommendations for Further Research and Practice

General Study Limitations

In reviewing the results of the current study, the following general limitations should be taken into account:

1) *Generalizability*: Although the number of participants in the study was similar to that found in live workshops, the small sample size used greatly limits the generalizability of the results. Also, as the participants came mostly from the faculty of Education where computer skills are taught in lower level courses and only one student came to the workshop as a non computer user, it is not known whether the results would be as favorable for students who did not have a similar background. The study findings should therefore be considered exploratory in nature. Further replication with larger numbers of participants will be needed to substantiate the inferences drawn.

2) *Special attention effects*: Although care was taken to preserve the ecological validity of the setting, i.e., for the reception and monitoring of the research assistant to be similar to that provided by a receptionist in a counselling centre, it should be noted that the participants in

this study likely received more and different attention as a result of taking part in a study than they would normally receive in a busy counselling office. As the RA was required to monitor the participants' reactions during the sessions whether they required assistance or not, it is possible that this observation led participants to feel either more or less comfortable in the lab setting (comforted by having someone "right there" or self-conscious from being watched) than they would had they been left more on their own. Also, as many of the participants were in direct telephone contact with me regarding a last-minute need to reschedule, it is possible that some of their communication needs were met in these brief interactions. These unknowns should be taken into account when viewing the reactions data.

3) *Recording effects:* Although participants were encouraged to provide honest evaluations of their workshop experiences, it is possible that their stated reactions were affected by the recording procedures used. During the lab sessions, while many participants displayed both positive and negative reactions at times, as the participants were aware that the RA was part of the research project, some may have withheld negative comments. Also, as session evaluations and final target complaints ratings were submitted or told directly to me as the counsellor and developer of the workshop, it is possible that the participants inflated their estimates of the degree of improvement felt or enjoyment of the workshop, not wanting to disappoint me. While the personal gains comments from online participants are similar to those made at the end of the live workshop, the quantitative session evaluations and estimates of change should be viewed with caution and combined with user comments when evaluating the effectiveness of the online version of the workshop. It should also be noted that as the Target Complaints method is thought to be most useful for assessing short-term change in presenting problems (see Chapter 3) and participants would not have had a chance to test their post-workshop reactions to many of the math-related situations described in the MARS, changes in pre/post workshop math anxiety ratings were not directly assessed.

4) *Reporting bias and missing data:* As participants' reactions to specific aspects of the workshop experience such as user frustrations were not collected until the final interviews, it is possible that their moment-by-moment reactions were forgotten over time. Although some of these within-session reactions were collected more immediately through RA observations and any major problems were reported under changes needed in session evaluations, it was not possible to collect ongoing reactions data from students working outside of the lab in later sessions who may have felt more frustration or need for assistance than was eventually reported. The inferences made particularly regarding the ease-of-use for off-campus delivery then should be considered tentative.

5) *Counsellor-instructor efficacy:* As an inexperienced online counsellor and instructor, it is likely that I did not sufficiently promote use of the online communication aspect of the workshop (e.g., facilitation of bulletin board discussions and e-mail contact with participants) as those more experienced with online delivery have learned to do. Although this lack of experience is likely typical for counselling staff, it is impossible to know whether the current trial was in fact an adequate test of participant use and preferences for communication options in an online workshop or whether participants would communicate differently with a more expert facilitator. Therefore the communication results should be viewed with caution. Recommendations for improved practice in this area are offered below.

Recommendations for Further Research and Practice

Research recommendations. The current study has provided evidence that an online student support workshop has the potential to be an effective tool for delivery of counselling support at a distance. Therefore further testing of online delivery as an option for student services counsellors is warranted. In addition to the need for replication of this research with many more participants in different student support settings to further validate these preliminary findings, the inference that such workshops might be effective for other student support topics (e.g., mature

student support, stress management) needs to be tested directly. Many questions related to the development and delivery of online student support workshops remain to be researched. For example, what are students' entering expectations and desires of an online counselling workshop? (i.e., Do they expect it to be like an online course or like a support group?; How much do they expect to be "analyzed" by computer and to have a personalized intervention?; How much individual interaction do they expect to have with an online counsellor?) Understanding these expectations will help counsellors to better orient users and create more satisfying interventions. Another important question to be determined, which was not systematically assessed in this study, is whether there are particular types of students who are clearly not suited to this form of counselling delivery (e.g., assessment of learning styles and personality characteristics of more and less successful users). As new interventions containing self-assessment are further developed (e.g., career counselling workshops), there is great potential to learn from this data to improve the screening process. Similarly, it will be necessary to know if there are types of students for whom special accommodations may be necessary (e.g., more mature students or those with learning disabilities). As computer technology advances (e.g., widespread user-end control of presentation such as changing size and colour of text or having text read aloud), the knowledge of user needs for such adaptation will be useful. Also, as suggested in the current study, pioneers in this area are discovering by experience, aspects of delivery that need to be targeted for further experimentation (e.g., encouraging online communication). Many questions can be investigated from these improvements, for example: Would improved social interaction lead to better attendance and completion rates? Would the improvement affect counselling outcomes?

Finally, it should be noted that as these investigations continue, while online interventions have the potential to allow the convenient collection and storage of a great deal of data from users, researchers need to be aware of the many special ethical considerations in conducting human subjects research on the Internet. The recommendations being developed for

online researchers (e.g., Childress & Asamen, 1998; Frankel & Siang, 1999) should be consulted in order that this research is not conducted at the risk of participants.

Practice recommendations³. In order to proceed cautiously and ethically in these further research and development efforts, while it may seem premature to make suggestions based on the preliminary findings of this study, from the experience of "going online" and listening to user feedback, some general recommendations for the improved delivery of online student counselling workshops can be made:

Online Workshop Topics:

- Consider for initial development, workshops that are particularly needed by distance students and those which are not likely to involve high levels of emotional distress for clients (e.g., not survivors of sexual abuse but perhaps survival skills for new mature students).
- Begin by developing workshops that have already been well-tested through live delivery or self-help format.

Design and testing:

- In designing the workshop, anticipate likely learner characteristics based upon those who typically attend the live sessions.
- Keep modules and text sections to a manageable length (verify through usability testing).
- Make print-and-use handouts. Online instructions should encourage printing of longer text sections.
- Build in the instruction to check both messages and bulletin board before starting on a session.
- Build in multi-media demonstrations wherever possible to facilitate learning and transfer of new skills.
- Use interactive exercises and a variety of media in addition to text.
- If an exercise is essential for learning and self-awareness, make it a key part of the workshop and easy to complete online, rather than homework.
- Pare down homework assignments to be manageable timewise.
- Conduct usability testing with non-clients first, then clients with a live helper available.

³ See above for specific delivery recommendations for the online math anxiety workshop.

Registration and orientation:

- A small workshop fee may increase start and completion rates.
- Have all students complete an orientation to the online system with a helper and have new users try out all workshop features independently, particularly communication features, before beginning the actual workshop sessions. If students are unable to come to campus, provide an online orientation and have a helper (by phone) talk them through use of each feature. If a new student seems very anxious in using the technology, the counsellor should be alerted so that other options or extra assistance during the first session may be offered.
- In the orientation, help students to anticipate the need for support to start and continue (i.e., pre-warn students about the potential pitfalls of distance learning). Suggest completion/time management strategies to new starters (e.g., "*Consider picking a time that is likely to work for you each week and 'block it in' to your calendar, just as you would a regular class. You'll also need to block in time for practice or homework assignments.*") Monitor and perhaps call to check progress following a mid-term break, in order to help students keep up momentum.
- Have all students choose pseudonyms to use throughout the workshop and explain the expectation and importance of participation in group discussions and maintaining regular e-mail contact with the counsellor.

Delivery:

- Consider a hybrid approach for more generic counselling needs such as stress management: an orientation session and mini-discussion offered at various times during the semester for those interested in starting, then branch into live or online groups as fits their schedule and preferences.
- If online counselling workshops are completed on campus, a partitioned space should be made available and assistants alerted to the need to give users privacy until help is requested.
- Identify a technical back-up person for students to call if they are permitted to work from home. Front-desk counselling personnel can be provided with a list of optimal settings, hardware and software required for home use but particularly during high student traffic hours, should not be expected to add trouble-shooting technical difficulties to their duties.
- Although some counselling topics such as math study skills and math anxiety may seem rather benign, self-awareness and autobiography exercises could trigger memories of abuse or lead to feelings of extreme sadness. Therefore it will be essential for the counsellor to: 1)

make contact (in person or by phone) and exchange contact numbers before allowing students to start the workshop, and 2) stress in person and online that telephone contact should be made in the event of a strong emotional reaction.

- If the counsellor is highly inexperienced in online communications, training should be undertaken if possible. At a minimum, the counsellor should practice using the system during usability testing. (Additional training may be obtained from Self-Help & Psychology Magazine articles by Internet Psychology expert, John Suler: "*Important things to know about email*" at: <http://www.shpm.com/articles/internet/index.shtml> . This page offers links to many new articles including cross-cultural e-mail and an e-mail makeover.)
- Bulletin board discussions should be monitored closely and non-participants should be encouraged via e-mail to join in.
- A brief weekly telephone or email check-in should be made by a senior peer or the counsellor (e.g., "*Just called to see how the online workshop format is going for you.*") This is important to help personalize the experience, motivate the participant (someone cares about their progress) and essential from an ethical standpoint, to ensure that the counselling method is continuing to work for the client and that discontinuation and referral is not more appropriate (cf., following up on no-shows for individual or group counselling).
- Just as for live workshops, every effort should be made to communicate with all users at the time of exit, to assist in planning appropriate next steps and to continue evaluating the delivery method for evidence of negative and positive effects and special characteristics of successful and unsuccessful students for future screening. As this delivery method may not suit some clients, it will be especially important in dealing with those who fail to complete, to ensure that they are not suffering from another perceived "failure."
- Encourage use of the site by other counsellors less familiar with the workshop topic as a repository for printable handouts, supplementary reading and resource lists.

In conclusion, the online counselling workshop appears to have the potential to be an effective support alternative for those who require distance delivery as well as a useful supplementary tool for live student counselling. Some further development and practice incorporating the recommendations given above will likely be needed before it may be used optimally with a wide variety of students. Today the online counselling workshop is probably most useful for those students who have already experienced online courses and have enjoyed

them, therefore it seems to have potential for use by online and distance learning institutions that require student support. As suggested by the recent proliferation of online self-help and support groups (see King & Moreggi, 1998), as our students become more connected at home and even more experienced with the use of the Internet for electronic information delivery and e-mail communication, it is likely that the online workshop will become even more viable and popular in student counselling as an alternative delivery option for those who need it.

“The full long range impact of the internet on counseling and advising support remains to be seen... Embracing change will permit us to use these new tools to more effectively serve our students.” (Ross, 1999)

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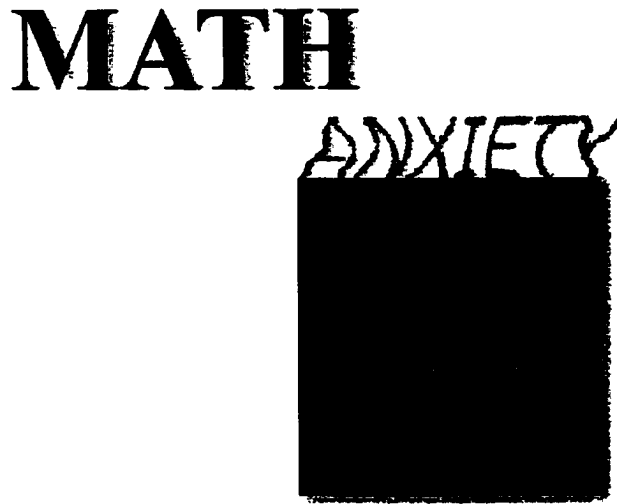
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Does the thought of dealing with math make you scream? This is for you ...

Site Overview and Contents Links

1. Sign In Here First Every Visit
2. Online Workshop & "Getting Around" Info
3. Session 1
 - 3.1. What is Math Anxiety?
 - 3.1.1. What is Anxiety? Slide 1
 - 3.1.2. What is Anxiety? Slide 2
 - 3.1.3. What is Anxiety? Slide 3
 - 3.1.4. What is Anxiety? Slide 4
 - 3.1.5. What is Anxiety? Slide 5
 - 3.2. My Reactions to Math
 - 3.3. How Did I Get This Way?
 - 3.4. Am I Doomed?
 - 3.4.1. Math Anxiety Bill of Rights
 - 3.4.2. Math Journal
 - 3.5. Math Skills Self-Assessment
 - 3.5.1. Math Basic Skills Test
 - 3.5.2. Math Skills Analysis
 - 3.6. Assignment #1
 - 3.6.1. Math Memories
 - 3.7. Session 1 Evaluation

... cont.

- 4. Session 2
 - 4.1. Math Myths
 - 4.2. How I Learn Best
 - 4.3. Gentle Math Refresher: Numbers Overview
 - 4.4. Numbers Overview: Addition
 - 4.4.1. Mental Arithmetic Exercise
 - 4.5. Multiplication & Large Numbers
 - 4.6. Math Study Strategy: Note taking
 - 4.7. Math Study Strategy: Self Talk
 - 4.8. Numbers Overview: Subtraction
 - 4.9. Division & Small Numbers
 - 4.9.1. Divisibility Tests
 - 4.10. Math Words Crossword
 - 4.11. Assignment #2
 - 4.11.1. Safe Practice 1: Whole Numbers
 - 4.12. Session 2 Evaluation
- 5. Session 3
 - 5.1. Common Stumbling Blocks
 - 5.2. Fractions, Decimals & Percent
 - 5.2.1. Fractions Summary
 - 5.3. Decimals & Percent Continued
 - 5.4. Math Study Strategies: Relaxation, Journalling, Mnemonics
 - 5.4.1. Progressive Relaxation
 - 5.4.2. The Trouble With Math
 - 5.5. More Handy Basics: Prep for Algebra and Beyond
 - 5.5.1. Symbol Shock
 - 5.5.2. Interactive Algebra Practice
 - 5.6. Dealing with Higher Math
 - 5.7. Performing Math: Problem-Solving & Exams
 - 5.7.1. Performing Math Continued
 - 5.8. Math Study Tips Summary
 - 5.9. Preventing Math Anxiety
 - 5.9.1. Multisensory Teaching
 - 5.10. Where Do I Go From Here?
 - 5.11. Assignment #3
 - 5.12. Session 3 Evaluation
- 6. Break Time?: Some Comic Relief
- 7. Extra Practice Questions
- 8. Math Study Skills Resources
- 9. Calculator
- 10. Acknowledgements

Need HELP? use help button on home page

APPENDIX B

Student Information Questionnaire

Student Information*

(* You have our assurance that all information given will be held in strict confidence)

About You

Name:

Age:

Female

Male

Current Occupation or Career Goal:

Contact telephone number (or E-mail):

Password preferred for log-in:

(max. 8 characters)

About Your Education

Current Program (degree/diploma/major):

Highest education completed:

Highest level math course completed (& when):

Are you taking a math course now? If yes, which one?

Why are you interested in taking math?

About Your Math Difficulties

What is your major concern in dealing with math (your reason for seeking help)?

What do you need from this workshop?

List some math topics you'd like to tackle:

APPENDIX D

Online Session Evaluation Questionnaire¹

Online Workshop Evaluation:
Session 1



Directions: Please describe your experience of this workshop session by selecting descriptors that are true for you. For each word pair, select a number from 1 to 5 where 1 means "more like the word on the left", 5 means "more like the word on the right" and 3 means "neutral".

1.....2.....3.....4.....5
left word (neutral) right word

"This session was":

1. 1 ☺ 2 ☺ 3 ☺ 4 ☺ 5 ☺
dangeroussafe

2. 1 ☺ 2 ☺ 3 ☺ 4 ☺ 5 ☺
difficulteasy

3. 1 ☺ 2 ☺ 3 ☺ 4 ☺ 5 ☺
worthlessvaluable

... cont.

¹ The presentation has been reduced where necessary to fit the page.

Right now I feel:

4. 1 2 3 4 5
 sad.....**happy**

5. 1 2 3 4 5
 afraid**confident**

6. 1 2 3 4 5
 detached**involved**

Now please take a moment to summarize:

1. What was the most valuable part of this workshop session for you?

2. What changes would you recommend for future versions? (considering both content and presentation, is there anything that you'd like to see more or less of, or anything that was difficult for you?)

Thanks very much for your input!

APPENDIX E

Workshop Evaluation Interview Guide

Interview Orientation:

Reminder that interview responses will be kept strictly confidential -- don't have to respond to a question if prefer not to. Reminder there are no right or wrong or preferred responses -- honest and specific/detailed personal responses are the most useful for research purposes, therefore only give truthful answers and not those assumed to be preferred by the researcher.

Topics to be covered:

General Reaction

Overall rating of the workshop

Reasons for this rating

Personal gains from the workshop

What was learned: knowledge, attitudes, skills

Reaction to online delivery

Enjoyed this method of delivery? (Fun? Interesting?)

Difficult/easy to learn using this method?

More/less than or same effectiveness as traditional methods for learning?

Any perceived benefits of delivering the workshop online?

Any perceived drawbacks of delivering the workshop online?

Initial reaction when discovered the workshop was to be delivered online

Any changes in that reaction over time -- Pleasant surprises? Growing concerns? Frustrations/annoyances? Give specific examples if possible.

... cont.

Multimedia presentation

In terms of presentation, what was (personally) most beneficial? What was hindering? Audio, video, slide shows, interactive exercises

What was well done? overdone? / lacking?

Communication modes

Which online communication modes were attempted -- email to counsellor, email to other participants, conferencing? If not, why not.

Which mode(s) preferred. Explain.

Contact with counsellor

Satisfying? Frustrating? Needed more? Change over time?

Contact with other group members

Satisfying? Frustrating? Needed more? Change over time?

Recommendations

Recommendations for change -- what should be kept the same; what should be changed to increase learning and enjoyment.

More of Less of

Comparison to live workshop

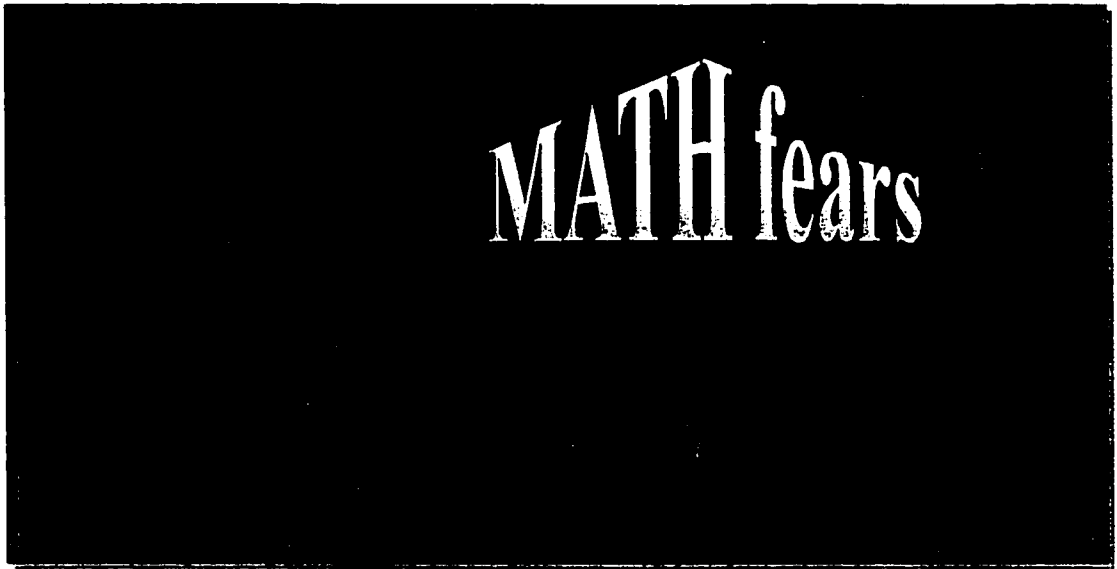
Ever attended a live counselling workshop? How does the online workshop compare - major differences and similarities, time involvement?

Preference? Recommendation to others with the same problem?

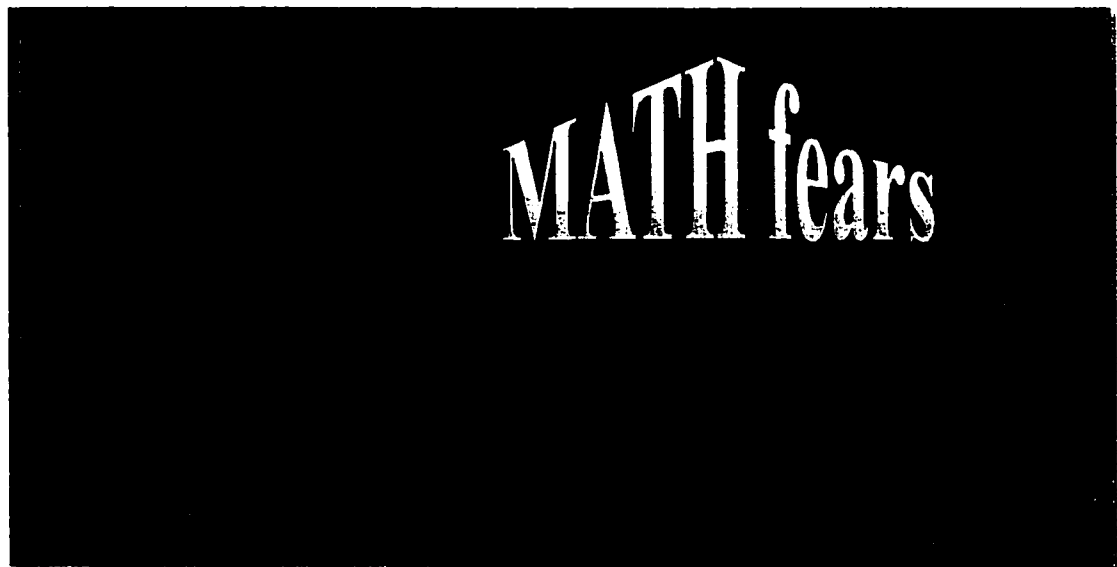
Need for further counselling

APPENDIX F

Recruitment Notice



Notice used for recruitment outside of the Faculty of Education:



APPENDIX G

Recruitment Letter*

To: Department Office Reception
Date: January 22, 1999
Re: Math anxious individuals

I am currently collecting names of *students and staff members* who identify with the term "math anxious" and would like information about help available to overcome this difficulty.

Attached is a flyer (more are enclosed for handouts) inviting individuals to contact me at my office in the Education building. Currently I am developing individual and group interventions that involve a combination of counselling/understanding the psychology of math anxiety and (gently) re-learning basic math skills. The sessions are designed to increase comfort with using and learning math in everyday and academic situations. As I need to gain an idea of the number of interested individuals on campus, I would appreciate your help in making this information available to staff and students in your department.

Thanks for your help!



April Buchanan, M.A. (Educ)
Director of Student Affairs
Undergraduate Student Services
Faculty of Education (492-7375)
april.buchanan@ualberta.ca

* The original was printed on Undergraduate Student Services office letterhead

APPENDIX H

Procedures Summary

Participants

REGISTRATION (Undergrad Student Services Main Office)

Pick up registration material

OR Call for mail-out of material:

- Study Information Sheet

- Student Registration Form

PREASSESSMENT DATA:

- Target Complaints Rating

- Mathematics Anxiety Rating Scale (MARS)

- Computer Thoughts Survey (CTS)

Return all material sealed

Make Session 1 appointment (lab booking)

(informed will be contacted if necessary from screening)

SESSION 1 (computer lab)

- Complete Study Consent Form (paper)

- Complete workshop orientation

- Begin workshop Session 1 (online)

- Submit online session evaluation if complete

- Print desired handouts; readings

Complete Session 1 homework (home)

Counsellor/Research Assistant

SCREENING (Counsellor)

Answer queries re: study + workshop

Review participant information

Score anxiety scales

Contact unsuitable registrants; refer elsewhere

Set up WebCT account for suitable registrants

OBSERVATION (Research Assistant)

Explain information in consent form

Demonstrate, answer questions re: navigation , WebCT

Note questions asked; participant affect

Assist with printing

Confirm next appointment time (lab booking)

ONLINE (Counsellor)

Review entries made

Respond to online messages

Monitor discussion list

... cont.

SESSION 2 (USS 1-107A)

- Submit Session 1 homework if completed (sealed)
- Check online messages from counsellor, discussion list
- Resume workshop Session 1 if necessary
- Begin workshop Session 2
- Print desired handouts; readings
- Submit online session evaluation (2) if complete

Complete Session 2 homework (home)

SESSION 3 (USS 1-107A)

- Submit Session 2 homework if completed (sealed)
- Resume workshop Session 2 if necessary
- Begin workshop Session 3
- Print desired handouts; readings
- Submit online session evaluation (3) if complete

Complete Session 3 homework (home)

ADDITIONAL SESSIONS (IF NECESSARY) (computer lab)

FINAL MEETING (USS 1--107A Ed. N)

POST ASSESSMENT DATA:

- Target Complaints♥
- Workshop Evaluation Interview
- Final Debriefing and Referral (if necessary)

OBSERVATION (Research Assistant)

Answer questions as needed
Note questions asked; participant affect
Assist with printing
Confirm next appointment time

ONLINE (Counsellor)

Review entries made
Respond to online messages
Monitor discussion list

OFFLINE (Counsellor)

Review homework submitted + make written comments

OBSERVATION (Research Assistant)

As in Session 2 above

ONLINE/OFFLINE (Counsellor)

As in Session 2 above

Conduct interview (Counsellor)
Arrange for pick up of homework (if necessary)

APPENDIX I

Explanation to Participants

Workshop and Study Description

Thank you for your interest in Math Study Skills for the Reluctant. This workshop is a newly-developed online (Internet-based) version of a successful live program for reluctant math learners. The workshop consists of three interactive multimedia (audio, video, graphics and text) sessions and is designed to help learners feel calmer and more in control when dealing with math. It uses an easy-to-take, step-by-step approach designed to help you:

- understand and cope with your math fears
- assess your current math knowledge and study skills
- learn methods to study math more effectively, and
- "safely" tackle some common stumbling blocks such as fractions and algebra.

The workshop is being offered free of charge to you if you would like to give it a try, in return for your help in evaluating the workshop delivery method. The workshop content is *not experimental*, in the sense that it follows the same material as is used in the live version. The new aspect to be evaluated is that this version has been developed to be delivered by computer instead of with a live group, with the counsellor available through a computer message system within the workshop. This delivery method was developed as it is often difficult to offer the workshop often enough and at convenient times for both the students and the counsellor. The study behind this project therefore is aimed at discovering whether a counselling workshop delivered via the Internet is enjoyable and effective for students, and whether it is useful as an alternative service delivery method for university counselling services. Your input regarding these questions will be very valuable to the researcher/counsellor for future development of the workshop and insights into students' reactions to computer-delivered counselling.

If you decide to register for the workshop, you will select two - hour weekly "appointment" times convenient for you, for working through the three sessions *at your own pace* on a lab computer (some students will complete all three sessions in four weeks, but you are encouraged not to rush to finish each session during one lab booking – you may return that week or next to continue where you left off within a session). A lab helper, hired specifically to help with this program, will be present at all times. There is *no computer knowledge required (or assumed)* to take the workshop as you will be guided by both simple online instructions throughout the workshop and the lab helper when necessary. The only requirements for participation are that you work through the sessions, hand in any paper-and-pencil homework completed (brief application exercises or journal writing) and fill out brief session evaluation forms at the completion of each workshop module. In addition, you will be interviewed by the counsellor (in person) about your reactions to the workshop and aspects of the computer delivery method in a final tape-recorded workshop evaluation interview of approximately 30 minutes.

Although your cooperation with the project is very valuable for the research and future development of the workshop, you are free to choose not to participate in any aspect of the workshop or evaluation study and may withdraw at any time by informing the counsellor if the need arises. In such case the counsellor will attempt to find alternate resources that might be available for you.

Confidentiality and Anonymity

When you use the online workshop, you will enter with your own password and all of your responses to questions, exercises, and self-tests in the sessions will only be accessible to you and to the

counsellor. Similarly, the content of any messages that you send to the counsellor, paper-and-pencil assignments and answers to interview questions will be held in strict confidence. Great care has been taken to select an online workshop environment that allows this protection to student participants so you may be assured that any information you submit while online is secure. When it comes time to report the results of the study, your responses will be reported anonymously (without your name) and will be grouped with those of other respondents. In addition, if you wish to remain anonymous to the lab monitor and counsellor you are welcome to use a pseudonym (false name) on your registration form.

Contact Information

Please also feel free to ask questions regarding any aspect of the research that is unclear to you by calling April Buchanan at 492-7375 (or email to april.buchanan@ualberta.ca) or the research supervisor Dr. T. Craig Montgomerie at 492-3667 (ext. 227).

If you would like to take the workshop, please complete the paper-and-pencil questionnaires in this package and return them for the attention of the counsellor and researcher, April Buchanan, sealed in the envelope provided to 1-107 Education North (Undergraduate Student Services) – if you are unable to return the questionnaires prior to your first lab appointment, please bring them with you to hand to the lab monitor.

Participant Agreement

Please review the study information provided above, then answer below.

1. **I have read and understood** the study information.
2. **I agree to participate** by completing the workshop sessions and brief online session evaluation questionnaires and by taking part in a final workshop evaluation interview of approximately 30 minutes. I understand that while my assistance with the project is valuable to the researcher, I may withdraw at any time if I feel I cannot continue.
3. **I permit the researcher to record my responses made during the online workshop sessions and to tape-record my final evaluation interview.** I also permit the researcher to preserve my responses after the study has ended for comparison in further similar research studies. I understand that all such information gathered and preserved will remain strictly confidential and will only be reported anonymously (without my name attached) or grouped with those of other students.

Participant Signature

Date

April Buchanan, M.A. (Educ)
Counsellor, Director of Student Affairs
Undergraduate Student Services
Faculty of Education
University of Alberta
Tel.: 492-7375 Email: april.buchanan@ualberta.ca

APPENDIX J

Instructions to Research Assistants

Math Study Skills RA Instructions (bring to refer to each session)

Contact Numbers: April (xxx-xxxx, xxx-xxxx) Valerie (xxx-xxxx), Jill (xxx-xxxx), Karla (xxx-xxxx)

In case of difficulty, ask for help from the reference desk or call my office 7375 from the library phone.

Bring to each session: Pen/pencil, paper, OneCard, headphones, RA Log sheets, glasses, calculator, sense of humour (you may need this in case of technical difficulties ;-)

SESSION 1

Students will report to the Coutts Library computer lab. They will have been instructed to bring: pen/pencil, paper, headphones if they have them, glasses if they need them, calculator if desired, OneCard.

Prior to students' arrival

- Start up Netscape on the workstations needed for that session. Go to the WebCT course listing: <https://webctdev.srv.ualberta.ca> , then click to go to the public_show page of course titles. Students should start on this page and log in to their account. Account IDs are: First Initial, Last Name (e.g., ABuchanan) , Passwords are initially set to: changeme , then to what the student indicates as a preference once I receive their student information sheet.

When students arrive

- Introduce yourself and orient students to designated workstations
- Hand out Math Study Skills preassessment packages to those who haven't already completed them. On the Target Complaints Questionnaire, the top line "please list your reason for wanting counselling help at this time" should be similar to their answer to "What is your major concern in dealing with math" (on the Student Information sheet). The package of questionnaires should be completed and handed to you sealed, **prior** to starting the workshop.
- Briefly orient new users to Netscape (url, back, forward, reload, status bar, print). Explain that most of the page movement (navigation) will be done inside the workshop and not from the Netscape menus but that they can always use these if they have to. Reassure that you will be there to help and that most of what they need to do will be explained in the workshop.
- Demonstrate the volume control: lower right "speaker" icon on bottom button bar.
- Have students log in to the workshop.
- Explain the home page buttons. Look at Help and Messages together.

... cont.

- Have students sign in using the password button. Explain that they must sign in every time they come back to the workshop (even in the same session).
- Have students start with Information then go to the Contents and begin at the top.
- **IMPORTANT: STUDENTS MUST PUT THEIR INITIALS AT THE BOTTOM OF ANY SUBMISSIONS** (e.g., input boxes on pages)
- Students are to continue working through the session until they need to take a break. They don't have to stay for the whole lab time – they are welcome to return during a later session that week or continue session 1 the next week (there's no rush).
- Assist with printing handouts.
- Once they have completed a session, they should complete the online Session 1 evaluation and make sure they have printed off their homework assignment to do for next time.
- Discuss when they would like to return. Record on log sheet. We will phone them if there are too many students booked for one time.

Please keep track of your hours and submit them to me after two weeks. ☺

THANK YOU!

APPENDIX K

Research Assistant Recording Log

RA: _____ Lab Session: _____ (date) _____ (time)

Student 1: _____ Session # ____ Start Time: _____ End Time: _____

Work turned in? Y N Page started: _____ ended: _____ Next lab time: _____

Notes: (student comments, difficulties encountered, enjoyment, and note associated page)

Student 2: _____ Session # ____ Start Time: _____ End Time: _____

Work turned in? Y N Page started: _____ ended: _____ Next lab time: _____

Notes: (student comments, difficulties encountered, enjoyment, and note associated page)

Student 3: _____ Session # ____ Start Time: _____ End Time: _____

Work turned in? Y N Page started: _____ ended: _____ Next lab time: _____

Notes: (student comments, difficulties encountered, enjoyment, and note associated page)

Please use reverse for your general observations of this lab session.

APPENDIX L

Final Interview Response Summary

This summary is based on 11 final interviews conducted face-to-face (C, E, I, J), via telephone (B, H), and via email (A, D, F, G, P).

General Reaction

Overall rating of the workshop

- *This was absolutely wonderful. Thank you very much! It was laid out well and had a good progression of topics. Overall it was very good.*(B)
- *I found it very informative. You learn those little things that we tend to forget and that teachers don't tell you – like their “secret handbook”. There were things in there that I never learned how to do -- like division. It was refreshing going back over the stuff I learned before. This was a confidence booster. For some of that stuff, I could get it for the first time in my life. I really liked it. I think it would be really helpful.* (C)
- *I thought the workshop was very well designed and thought out. It was clearly written by someone who either has clear insight into math anxiety or has experienced it themselves.* (D)
- *It's worthwhile. You realize there are things you do know and other people who feel like you. I think it's good for people with this problem. They need to find a way not to avoid it –to take advantage of help. It's like having your period: you have to deal with it.* (E)
- *This site/seminar would be beneficial to someone who needs to refresh their skills and abilities.* (F)
- *There wasn't as much math instruction as I expected after I had done the test. I really could have used this when I first started back (I put off taking math till the end). It was interesting. It would help my own kids.* (I)
- *I enjoyed it. (I need one of these sessions once a month – I tend to get excited, then it dies down.* (J)

Personal Gains

What was learned: knowledge, attitudes, skills

- *Well, the initial information and de-stressing techniques were invaluable. I remember thinking. Gee, April has brought together the latest research in a very helpful manner. Besides the latest research being really kind, and absolutely right, such interest in us high anxiety types kind of “normalized” how I feel and behave. It was really healing. That came out in that focus group you had and in initial use of the bulletin board (until other priorities entered). I mean some heavy personal stuff*

was going on for most people when they got turned off [of math]. So, the anxiety level I felt is way down. (A)

- *From the testing, I realized that I mostly make simple mistakes and just need to refresh and practice. I'm planning on taking a math course through Grant McEwan [Community College] so it won't count against my gpa. I'm ready now! (B)*
- *I learned what kind of learner I am. If I don't understand, there are five different ways to do it -- AND that I'm not really that bad at math. I always thought that I was just bad at math. I learned I do have the staying potential. It's not that it's hard. The learning styles information and the cartoons were really helpful. The cartoons I can really relate to and hearing about other people too helps you say, "OK, I'm not the only one." (C)*
- *What I gained most from the workshop was a (surprising) revelation that, while math is not a "strength" for me, I'm probably not worse than average. In fact, since that workshop I've done some informal testing of myself in various situations, and it turns out I can estimate and add numbers in my head to a pretty good degree of accuracy. It was a pleasure to discover this and have evidence to oppose to my self-image as completely incapable in all things math. (D)*
- *What you do know about math. I learned some new symbols, some algebra stuff and it helped me to call up old stuff. I also learned what you apply to another subject, you can apply to math like making cards because I'm a visual learner. (E)*
- *I decided to get a tutor to work with me one on one with my math. Through your workshop, I discovered that I have forgotten a lot! It has helped but I did tend to drift, I think my learning really requires someone to be along side with me teaching it to me. (G)*
- *I learned that my basic math skills aren't as bad as I thought. I also got better with the computer. It felt better knowing that other people felt similarly. (H)*
- *I learned some new things – things I'd never been clear on. I liked doing the math test: I wanted to evaluate myself so it was interesting to see where I was. (I)*
- *I felt more positive, more hopeful. I also learned some things I needed to work on like math terms, thousands, adding and dividing fractions and statements to talk yourself through it. (J)*
- *From doing module 1, and taking that math test, I realized that I struggle with the very basic concepts of math. Therefore it is hard to build my math skills without a foundation. Knowing this, gave me a focus towards working through a basic math book and strengthening my math basics. This is important as I face my practicum and teaching future. This alone would give me more confidence. Another gain made from the workshop and the research you gave me, was that I understood for the first time that if I take some time to work with math and build my confidence, I could overcome my math weakness. In other words, this is not genetic!! Although I didn't make major math strides, my new found awareness has gone a long way towards breaking down my fear and understanding what I need to improve. These were two things I didn't have before. (P)*

What was particularly helpful / hindering?

- *the learning styles info and the cartoons – you can really relate to other people: “OK, I’m not the only one.” (C)*
- *Concentrating on the computer was hard, and not having the solutions to math problems right away. (E)*
- *It was helpful to see how other people felt. Their stories were very moving; there were parts of each one that you could relate to. It was also helpful to see what kind of learner you are and the best strategies to use. I found at times there were too many cartoons. They distracted me in the middle of a reading when I wanted to get to the meat of it. (I)*
- *It was helpful learning how to cope and studying skills, especially realizing that it doesn’t have to be drudgery but I can make it a lot of fun by making a beautiful learning environment, playing with felts Going to a lab was strange, wondering what people were thinking if I needed a lot of help.... (J)*

Reaction to Online Delivery

Enjoyed this method of delivery? (Fun? Interesting?)

- *Hey, the information was so good, I don’t care how it is presented. I was comfortable clicking around the sites and stuff. (A)*
- *I liked it. I found it easy to work at your own pace – you could take your time with difficult things. (B)*
- *It worked for me because you don’t feel the pressure of being part of the institution. You can just go in on your own time. I liked the lab because of the other people – the first session especially. It’s nice to come here. (C)*
- *It was different. I still like one-on-one but it was doable – you could work at your own pace. (E)*
- *I found it easy to receive information in the format that you have presented. The sound bites and clips were an added bonus and broke up the monotony of just reading the text on the page. This is beneficial especially while working on a computer. These clips and tidbits also helped me to see that I was not the only one with these problems like I thought. I also like the fact that this seminar could be accessed from the internet at one’s own convenience. This was helpful because sometimes it is impossible or at the very least difficult to attend all meetings. (F)*
- *It was surprisingly fun. (H)*
- *It suited me. I could work on it at odd hours. (I)*
- *At first it was all overwhelming: at the beginning I didn’t realize I could print it all. I liked it for the personal part – being able to print and keep the pages you want. I*

think it would be more fun if I could do it at home. But I liked having another person there. I think I'd like to do it in a small class. (J)

Difficult/easy to learn using this method?

- *I didn't find it hard to learn math using this method but I felt a bit scared to write much – once I wrote down a reaction but I didn't realize it was going to other people. What might be good would be to be able to post anonymously. (B)*
- *Easy. (C)*
- *I found it hard to concentrate on the computer so I liked to print off as much as possible. It was frustrating if something didn't print. (E)*
- *I did lose track quite often because I felt like there was a bit too much to read. I guess you could say that I have a pretty low attention span when it comes to this kind of stuff. (G)*
- *It was tiring reading at times and I had the computer learning to overcome. (H)*
- *It wasn't difficult. I needed guidance at first. (I)*
- *Difficult. I felt rushed in the lab to complete a session. (J)*

More/less than or same effectiveness as traditional methods for learning?

- *More. You don't have the outward distractions – the other people around. Other people talking a lot distracts me. This way you can pose your own question when you want to and anybody can answer. (C)*
- *As effective. It's better not having to worry about getting all the notes in class but not as good when you'd like to talk to a person. (E)*
- *I think what would benefit me more is if I were actually in a class, or if it was a little more hands-on. (G)*
- *For me, I like to interact more with other students. Although I don't say much, I enjoy listening to discussions. (H)*
- *I think it depends on the learner. (I)*

Any perceived benefits of delivering the workshop online?

- *1) Access to print and electronic formats*
- *2) That the course, kept track of where I'd left off that last time. (Although, I'm not sure even a computer can remember how long it is since I worked on this.)*
- *3) The little journal activities were neat. Kind of broke things up.*
- *4) Quick access to more in depth information*
- *5) Immediate feedback to the little tests.*
- *6) I felt pretty embarrassed not finishing the pre-test within the time allowed. But it was a somewhat private embarrassment. I may have felt worse if this happened in a regular classroom.*
- *7) Flexible timing is a benefit, so is access to you and the lab assistant. (A)*

- *You get to adjust to your own learning – there's no conformity. No matter how old you are, if it doesn't work right for you this way, you can always go back. You can send a question in and someone will help. It's not like you're left to your own devices like in a lecture. My math teacher teaches 300 people. (C)*
- *It's good for people to do at home: you can stop and start when you want to. (E)*
- *Scheduling, privacy, remaining anonymous -- it's safer to be on my own. Availability for people who aren't in the city. I think it would be useful even for grade 9/10 level students. (I)*
- *It's one-on-one. More private. I think for someone with a phobia to get started it would be better on a computer. (J)*
- *The content was well organized on the computer so that made it very easy to follow. Also, I felt comfortable being honest with the computer! (P)*

Any perceived drawbacks of delivering the workshop online?

- *I know myself well enough that I'd prefer a classroom setting. The social reinforcement would have kept me coming to class. (A)*
- *Not really, cause you get what you put in. There's less "screwing around". It was a sense of accomplishment, for me. (C)*
- *It's good to have access to a person – via email AND on campus. (E)*
- *A drawback was that there was no group to discuss issues as they came up and no feedback on any of the issues. It would be beneficial to talk to other people who may have the same feelings and anxieties as yourself. Finally if you were having a problem while doing the information on-line there was no one there to help you as there would have been if it was done as more of a counseling group. (F)*
- *It's faceless instruction so it's easy to not go if there's no one to answer to. It's also hard for those without computers and a long commute to come in for an extra lab. (H)*
- *I could see it being harder for people who might need the camaraderie and peer support of a live group; access to a computer is necessary. (I)*
- *At times the process seemed a little bit slow however, and it was difficult to see the results of my answers or receive much feedback. This aspect made it less motivating. (P)*

Initial reaction when discovered the workshop was to be delivered online

- *It didn't bother me. I'm actually better with a computer than with people these days: there's not someone looking over your shoulder. (C)*
- *I thought: "I've never done that before. Hopefully I'll be OK and not get confused." It didn't really scare me cause I'm better with computers now. I wrote down the steps to get into the system. (E)*

- *Computers scare me to death! (but I need to do this) (H)*
- *I was fine with that. (I)*
- *I was OK with it because I knew there was someone there to help. (J)*

Any changes in that reaction over time – Pleasant surprises? Growing concerns? Frustrations/annoyances? Give specific examples if possible.

- *I hadn't done any online courses before. There was a lot of material: it should be split up more so you can do each session in one sitting. I'd also recommend to people to go back and do the links after the session. (C)*
- *I needed help getting the microphone to work and it was frustrating losing stuff when I went to print sometimes. I wanted the solutions to the math skills test then. (E)*
- *Because I have always had difficulties with math, I know that I wasn't 100% motivated. (G)*
- *I wasn't as bad at math as I thought. I was surprised at getting the hang of the computer without too much trouble. (H)*
- *I liked having the time to do it at my own pace at home but I found working on my own computer frustrating, especially for session 3. The screen was too small so when there was a lot of reading, I had to scroll. (I)*

Multimedia Presentation

In terms of presentation, what was (personally) most beneficial? What was hindering? Audio, video, slide shows, interactive exercises

- *In the lab, some of the kids had the volume up pretty loud. That meant when there was a sound byte? bite? in the course it was pretty hard on the ears. Fortunately, your lab assistant was very quick at reading panicked faces and irrational use of the mouse. She came over to help show me how to turn the volume down. I don't know how that works. A warning to check the sound settings and how to get to that menu/dialogue box might have helped. (A)*
- *Sometimes with the audio you lose your place and continuity in the session. But the little movie cuts – I could get right into those. They really brought a different thing into it. Like the finger math: You think, "It's not just me if they brought that into a movie". (C)*
- *I preferred reading. The exercises were good; I wanted more of them. I liked hearing your (the counsellor's) voice talking: it was very calming. (E)*
- *At first I was worried about getting the audio and video to work but then I enjoyed it. (H)*
- *I remember what I heard more so the audio gave two ways of remembering. I couldn't get video at home. The exercises were very good. (I)*

- *The audio and video added to it. The exercises were fine. (J)*

What was well done? overdone? / lacking?

- *For the most part it was all pretty good and well laid out. It was all put together really well and the excerpts were done well. (C)*
- *The adding section seemed very long. (I)*

Communication Modes

Which online communication modes were not attempted – email to counsellor, email to other participants, conferencing? If not, why not.

- *If someone emailed me, I'd feel uncomfortable. (C)*
- *I read the stuff from other people on the bulletin board but didn't write to anyone. I wanted to get on with it. (E)*
- *I wouldn't feel comfortable sending messages to the group. I like to listen to others. I don't talk much in class. (H)*
- *Writing to the bulletin board felt like I was answering that person. I wouldn't have wanted to email to another person – I'd just want it to be to the general group. (I)*

Which mode(s) preferred. Explain.

- *I prefer discussing face-to-face. It would be easier to write if we'd met first and made eye contact: "Is this someone I can trust?" I like to feel I can let down my guard a little. It happens with email especially after time. I like to feel like I'm writing a letter to a friend then it's fun without worrying about spelling or sounding witty. (E)*
- *I liked reading the bulletin board. I would have liked more. (I)*
- *I didn't try them -- not knowing what to do, I was afraid of doing it wrong. I guess I didn't really want to. I take a while to warm up. It's the same in class. (J)*

Contact with counsellor (Satisfying? Frustrating? Needed more? Change over time?)

- *I could get a hold of you whenever I needed you. For me, I have to have 3 ways of doing something or it's not going to happen.(C)*
- *The right amount. (E)*
- *It was fine. I felt comfortable writing because I know you. (H)*
- *You were available when I needed anything. (I)*
- *I needed more sometimes, like when I was trying to do the exercises. Sometimes I wanted to talk after or during a session. (J)*

Contact with other group members (Satisfying? Frustrating? Needed more? Change over time?)

- *After the first session it was easier to go in on my own. If they needed help, it wouldn't interrupt me. (C)*
- *It never even entered my mind. I didn't have a lot of time on my hands. (E)*
- *It was fine having few people in my lab time. It's nice not to be watched. I really enjoyed working with Karla (the research assistant). (H)*
- *I thought near the end of having one live group session -- it would be neat to meet for coffee. (I)*
- *It would have been good to hear from the others. I didn't feel comfortable talking. (J)*

Other workshop features (features you would like to have seen in the workshop that were not available? – e.g., chat?)

- *No. That just distracts from what you're doing. With people that have never used it, that would become the focus. (C)*
- *For this, because it's like a learning thing, I would find it distracting. (E)*
- *Not in this course. In this case I prefer the bulletin board. I want to reflect first, then respond. (I)*

Recommendations

Recommendations for change – what should be kept the same; what should be changed to increase learning and enjoyment. (More of Less of)

- *It would be good to be able to refer to something to answer the math questions. Like a reference guide for the geometry part because it's hard to remember the formulas. (B)*
- *Not really. I really enjoyed it because I felt like I accomplished something.(C)*
- *Less of the little glitches like losing what you've written. It was done in manageable chunks – nicely set out (for me). (E)*
- *An index at the top of the page would be helpful. Letting people know to feel free to jump back and forth and recommend areas to go to first. (I)*
- *One thing I thought was maybe the RA could get to know the students first. She also trained us on the computer and said the name of the workshop in front of everyone in the lab. It would help to have some written instructions to use each time. (J)*

How would you recommend that the site/workshop could best be used by individual students or others?

- *Well, I'd promote it to Faculty of Education Grad Student advisors. Offer it as a pre-requisite or "gateway" course, outside the faculty as well. I used to hear discouraged*

undergrads talking about stats on the LRT. I didn't have enough knowledge going in. My instructor said I had the concepts, it was just my math that was the problem. Turns out he was right about the math anyway. Faculty of Arts stats courses would probably be happy to see this. Oh, do math majors in elementary and secondary ed study the same research? Do a guest lecture there. Lots of teachers end up teaching subjects they didn't major in. (A)

- *I printed off a lot of the pages and I'm going to get a binder. (E)*
- *I think that the workshop online is an excellent tool that should continue to be used to give the counsellor background information. But I do feel that it should be used with a personal counselling session as well. A blend of the two counselling aspects would keep up motivation and give more of chance to discuss results and feelings/ observations.(P)*

Scheduling recommendations?

- *It was really comforting for other coursework to have other grad students in the lab. I didn't have a good home computer then. (A)*
- *I found it easier to get to at home so I'd say, try to offer it that way if possible. But I know some people need to have a set class to go to, to keep on schedule. Maybe the best way to use it would be to have a regular drop-in class with a reference person so people could come in if they had trouble motivating themselves at home or needed help in certain areas. (B)*
- *I liked the options. (C)*
- *As for the scheduling options I felt that there was ample opportunity to go in and work. The times were easy to work around. (F)*
- *Having the option of completing the workshop via email is a terrific solution to deal with scheduling problems. Then, brief discussion meetings could be scheduled for one or a small group after the person has completed one or two major segments. The meeting could be as brief as 15 – 30 minutes if the person was getting what they needed from the workshop. (P)*

Comparison to Live Workshops

Ever attended a live counselling workshop? How does the online workshop compare - major differences and similarities. Preference?

- *I attended Al-Anon for teens and a group for depression. This would be similar if it was longer cause you could get to know the others. I preferred this (the online workshop): it's more one-on-one. I don't think you feel like you're on the spot. You're free – if you want to answer you can but you don't have to. They say if you don't, you're not making progress. Some of those groups are extremely deflating. (C)*
- *The main difference is that in a live group you don't take the responsibility as much. You can be a passive learner. Here the onus is on you -- you take the time to think about your responses. In a live group the discussion would be good but scheduling would be difficult especially if it was over and above the regular course load. (I)*

Need for Further Counselling

- *I have to convert some decimals to percentages to meet a deadline. Anyway, not knowing this is lack of awareness of rules and conventions not my inferiority. I just shut that kind of thinking down once it starts and accept that I have not finished that module...but it is there for me. I think it would be unkind to put myself through statistics without the kind of course you are offering here. I know that I don't look at math, at numbers with the insight that people dealing with stats everyday do. That's a goal, I guess for the future. But, I put it down to the difference in "numeracy" and know it is a matter of experience, hard work and KIND TEACHERS like you! So, I'm not brilliant yet. But I am more empowered and more convinced that I can acquire that knowledge. I wish you could share this with all math teachers. What a concept. We've covered how people learn to write quite well. Now people are interested in how students learn math! Interesting that more than half the solution is a qualitative one. (A)*
- *I also need to review the higher stuff – to really go over the main concepts. Other than that, I'm OK. (C)*
- *I still need help with learning higher math – to know the formulas to solve problems. (E)*
- *As I am now entering (and in my practicum) I find that I still have some issues and anxiety about teaching math. I think that my main problem is not that I do not understand the material but that I am unsure of how to make the lessons fun and interesting when I do not find the subject fun. I would really like to make math fun and so that fewer students end up with the anxiety that I have. I was wondering if you could suggest some ways that I could make my lessons more fun and interesting. Along with this any books or resources that I could use to guide me in that direction? (F)*
- *I'm going to practice a bit first, then go to AVC for an assessment. I just need to remember that I do know some of this – it's just a matter of practicing. I've developed a really bad habit of fuzzy headedness over anything with numbers. I need to think "you know this". I realize I just have to practice and be more aware of money everyday. (J)*
- *Since I didn't go on with the counselling, or do much with math since this summer, I still panic in the face of a number problem. I caught myself doing it this weekend at a restaurant. The only difference made is this; I tell myself now, "it's OK at least you know you do it", instead of, "how embarrassing, I can't even deal with the bill!" From this change in attitude, sometimes, I am calm enough to figure out the math. I believe that this minor but helpful change has come from the awareness gained from the workshop and the research. (P)*