

Interdisciplinary Perspectives in Early Intervention

Professional Development in Multiple Disabilities Through Distance Education

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This article describes the development, implementation, and evaluation of an online professional development course designed to develop an understanding of the foundations, perspectives, and strategies used by key disciplines (eg, occupational therapy, physical therapy, speech-language pathology, early childhood special education, visual impairment, and hearing loss) that provide services for infants with multiple disabilities and for their families. A total of 110 early interventionists in California completed the online course successfully. An overview of the course content, structure, assignments, and online instruction is provided. A discussion of outcomes includes feedback from participants on (1) their perception of changes in their own professional competencies based on pre- and posttest data, (2) their satisfaction with the overall course design, (3) challenges and benefits of online instruction, and (4) the impact of what they learned on their professional practice. Implications for future professional development efforts are identified. **Key words:** *distance education, early interventionists, interdisciplinary collaboration, multiple disabilities, online course, professional development*

THE LITERATURE on personnel competencies in early intervention has highlighted the need for interdisciplinary preservice and inservice training (Bruder, Mogro-Wilson, Stayton, & Dietrich, 2009; Horn & Jones, 2004; Malone & Straka, 2005; Rapport, McWilliam, & Smith, 2004; Sandall, Hemmeter, Smith, & McLean, 2005; Stayton,

Whittaker, Jones, & Kersting, 2001). This training is particularly important for early interventionists who serve families with infants who have multiple disabilities. Given the diverse needs of these infants and the challenges faced by their families, early intervention services for this population usually involve a number of service providers, often employed by different agencies. Variations in these service providers' training, disciplines, and intervention practices emphasize the critical need for interdisciplinary training, teaming, and coordination to ensure the provision of high-quality, coordinated, and family-centered services.

Federally funded personnel preparation projects have developed and implemented specific coursework and fieldwork targeting interdisciplinary teaming and practices (Crais et al., 2004; Hains et al., 2005). However, a regional survey of faculty across a variety of key disciplines in early intervention reported

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that interdisciplinary instruction was not a common strategy in preservice early intervention training (Mellin & Winton, 2003). In addition, a national survey of university faculty across disciplines found a minimal emphasis on teaming and service coordination in preservice training on early intervention practices (Bruder & Dunst, 2005).

Because of extensive requirements of state and national certification agencies, the preservice training of many disciplines lacks specific content on early intervention, particularly in working with families and their infants with multiple disabilities. For example, few graduate programs in the disciplines of education, speech-language pathology, or occupational therapy offer coursework in severe physical disabilities or hearing loss (Able-Boone, Crais, & Downing, 2003). Moreover, preservice programs in occupational therapy, speech-language pathology, and physical therapy have little or no content in early intervention (Campbell, Chiarello, Wilcox, & Milbourne, 2009). Similarly, there may be less attention to early intervention practices and coursework in severe disabilities even in early childhood special education (ECSE) training programs. For instance, a statewide study of interdisciplinary early childhood education and ECSE teacher training programs found that graduates reported a need for more content and application in working with families, with children who have moderate to severe disabilities, and designing implementing intervention strategies and activities for infants and toddlers with disabilities (Miller & Losardo, 2002). Although effective early intervention services, particularly those for families of very young children with severe and multiple disabilities, require the expertise of many disciplines, preservice training programs are unlikely to provide an interdisciplinary focus.

PROFESSIONAL DEVELOPMENT THROUGH DISTANCE EDUCATION

Early intervention service providers have been found to benefit from professional devel-

opment opportunities through distance education to develop skills in teaming and working with families and their young children who have multiple disabilities and to maintain currency in the recommended practices of their disciplines (Chen, Klein, & Minor, 2008). Distance education is an effective and convenient means of delivering training to professionals in the field and to provide accessible opportunities for lifelong learning (Bruce & Hwang, 2001; Chen et al., 2008; Ferrell, Persichitte, Lowell, & Roberts, 2001; Hughes & Forest, 1997; Ludlow, 2002; O'Neal, Jones, Miller, Campbell, & Pierce, 2007). In preservice programs, no significant differences in targeted participant outcomes (eg, course grades) have been found between online and traditional campus-based courses in special education (Caywood & Duckett, 2003; Steinweg, Davis, & Thomson, 2005). Moreover, faculty have reported that online discussions tend to be more substantive than informal classroom discussions because the Web-based environment provides (1) a convenient, comfortable, and equal access to the "floor"; (2) support for reticent students to participate because they have time to reflect; and (3) a vehicle for consistent and frequent faculty input (Baglione & Nastanski, 2007; Chen et al., 2008). Research indicates that a hybrid or blended model composed of online and traditional class meetings is an effective training format that capitalizes on the advantages of both online and face-to-face environments (Chen et al., 2008; Lifter et al., 2005; Tabor, 2007).

However, it is important to note that the effectiveness of distance education courses depends on several elements of instructional design. These include considerations of learner characteristics (motivation, experience, knowledge, skills, and learning style), interactivity (learner-content, instructor-learner, and learner-learner interactions); frequency and sufficiency of faculty participation in discussions and feedback on assignments; organization of content; instructional strategies; and evaluation of course design and outcomes (Bollinger & Martindale,

2004; Johnson, 2004; Zheng & Smaldino, 2003). For example, a problem-based learning approach is an effective instructional strategy that assists adult learners to engage in self-reflection and even challenge their current professional practices (An & Reigeluth, 2008; Chen et al., 2008; Gale, Wheeler, & Kelly, 2007; Johnson, 2004). In addition, technical support is essential and both faculty and students have been found to benefit from a face-to-face orientation to technology used in the course (Chen et al., 2008; Lifter et al., 2005).

This article describes the design, delivery, and outcomes of a professional development course for early intervention service providers that addressed the complex needs of infants with multiple disabilities and their families. The course used a hybrid approach to deliver instruction and was guided by elements of instructional design previously discussed. The course content focused on working with families; primary concepts and strategies across selected disciplines working with the targeted population; basic information about roles, responsibilities, and practices of selected disciplines; identification of ways in which service providers can share perspectives and learn from each other; and infusion of discipline-specific objectives and strategies across the family's daily routine.

PROGRAM DESCRIPTION

Course development

The project's advisory committee guided the design and content of this professional development course. The committee was composed of key stakeholders in early intervention services, including a representative from the state's lead agency for part C, director of the comprehensive system of personnel development for part C, parents of young children with disabilities, administrators and service providers of early intervention programs, and faculty from universities that offered ECSE training programs. On the basis of their knowledge and experience in the

field, the committee members identified (1) the most common direct service providers for infants with multiple disabilities (speech and language therapists, occupational and physical therapists, teachers with credentials in the areas of visual impairments or hearing loss, and early interventionists with backgrounds in ECSE) and (2) the most frequently identified areas of need for professional development in working with infants with multiple disabilities and their families. This input was used to develop relevant modules for the course and to identify instructors who would facilitate on-line discussions.

Course content

A team of interdisciplinary faculty representing the most frequently involved disciplines (ECSE, hearing loss, visual impairments, occupational therapy, physical therapy, and speech and language therapy) developed course modules and also participated in online instruction. Nine modules were developed:

1. working with families,
2. home visiting approaches in early intervention,
3. early communication development and the role of caregiver-child interactions,
- 4-5. sensory processing in the context of early intervention: parts 1 and 2,
6. motor development and physical disabilities,
7. vision development and visual impairment,
8. hearing loss, and
9. infusing interdisciplinary strategies within daily routines.

These modules of targeted content areas were contained on a CD-ROM that served as an electronic text for the online course. Each module contained learning objectives, an introduction to the topic, identification and description of key terms and strategies with video clips demonstrating selected strategies, family values and cultural considerations related to the topic, suggestions for interdisciplinary teaming, and a vignette. In addition, an introductory chapter to the CD-ROM listed

roles and competencies of an early childhood special educator and modules 3, 5, 6, 7, and 8 outlined the roles and responsibilities of related disciplines (speech-language pathologist, occupational therapist, physical therapist, teacher certified in visual impairments, and teacher certified in hearing loss). The content in the modules provided the basis for on-line discussion questions, learning activities, and assignments that were developed and organized into a 16-week university semester course. Participants who successfully completed the course received 3 semester units of course credit. Two sections of the course were offered every fall semester for 3 years resulting in the course being offered a total of 6 times.

Description of participants

Recruitment

Course information with the URL for the Web site containing the online application was disseminated by the state comprehensive system of personnel development agency for Part C and a state professional organization for early interventionists. Applications were received from early interventionists throughout the state. To be accepted for the course, applicants had to meet the following criteria:

1. current professional employment or involvement with infants with multiple disabilities and their caregivers,
2. a bachelor’s degree, and training and background in early intervention, and
3. basic computer word processing skills and a computer with e-mail access and Internet Explorer or Netscape Navigator.

Participants were enrolled in the course through the College of Extended Learning at the university, thus simplifying the application and enrollment process. The course was also an elective of 3 semester units at the graduate level.

Participants

Six cohorts participated in the training project. A total of 122 participants enrolled in the 6 course sections. One hundred ten participants (90.2%) completed all the course

Table 1. Educational backgrounds of students (*N* = 110)

Certification or degree	Percentage
Early childhood special education	17.1
Severe disabilities	13.5
Early childhood/child development	12.6
Nursing	9.9
Speech and language therapy	9.9
Unrelated BS (eg, liberal studies, Home Econ)	8.1
Psychology or social work	7.2
Occupational therapy	6.3
Physical therapy	6.3
Deaf and hard of hearing	4.5
Visual impairment	2.7
Elementary education	1.8

requirements successfully (an average of 20 in each class with a range of 9–22). Twelve (9.8%) participants did not complete course requirements mainly because of personal challenges (health concerns in the family) or changes in professional situations (move from early intervention to school-age focus).

As shown in Table 1, the 110 service providers who completed the course represent a variety of backgrounds and key disciplines involved in providing early intervention services to the target population. The disciplines with the largest representation were from severe disabilities and early childhood education/ECSE with speech and language therapy and nursing being the next largest. Six participants were also parents of children with disabilities. Five participants had backgrounds in more than 1 discipline (three were registered nurses and had ECSE credentials, one had credentials in ECSE and deafness, and one was a physical therapist who had an ECSE credential). Some participants, although employed as early interventionists, were not trained in a specific discipline related to early intervention. This variability

in qualifications reflects current personnel standards in early intervention programs contracted under the regional center system administered by the Department of Developmental Disabilities in California. Early intervention programs administered by school districts require service providers to possess a special education teaching credential in a specific specialization area (ECSE, severe disabilities, visual impairment, or hearing loss) or appropriate certification in their discipline (eg, nursing, occupational or physical therapy, or speech and language therapy).

Course instructors

Each section of the online course had a primary instructor who participated in online discussions and reviewed assignments. In addition, there were 5 discipline-specific instructors who were each "in class" (online) as coinstructors with the primary instructor for 1 to 2 weeks as scheduled to facilitate discussion related to their own disciplines. The 2 primary instructors had cross-disciplinary backgrounds in early intervention and were tenured faculty in ECSE training programs at different universities. One was also a certified speech-language pathologist and the other had teaching credentials in the areas of severe disabilities and sensory impairments. In an effort to model interdisciplinary collaboration, the primary instructor cotaught with each "visiting instructor" who had expertise in the specific discipline and had written the module. These coinstructors facilitated online discussions and posted comments to participants' questions and concerns related to the particular module. These visiting instructors included a parent of a child with a disability who also had a credential in visual impairments, a person with a hearing loss who had a credential in the deaf and hard of hearing area, a physical therapist, and an occupational therapist.

Course components and activities

As a professional development course for early interventionists, factual information was presented in multimedia form (text, graphics,

and video clips) on the course CD-ROM with frequent opportunities for feedback through online discussion with classmates and instructors and online quizzes on targeted topics. Each module contained a short vignette or case-based problem that was intended to stimulate application of course content via online group problem-solving discussions and individual reflections in a "case method" approach to instruction (Colbert, Desberg, & Trimble, 1996; Sudzina, 1999). Case-based problems have been identified as an important instructional design feature for advanced learners (An & Reigeluth, 2008; Chen et al., 2008; Gale et al., 2007; Johnson, 2004). In addition, 2 case studies were developed for individual written assignments (one for the midterm and the other for the final) that required demonstration of interdisciplinary perspectives and strategies.

Each course was composed of an initial 5-hour face-to-face orientation meeting, 13-week online instruction through asynchronous threaded discussions, a midpoint small group meeting at various sites for a videoconference, an optional synchronous online (text) discussion, and a final 5-hour face-to-face debriefing meeting (Table 2). Orientation and final meetings were held in the north (at the state school for children with visual impairments) and south (at the university) regions of the state to be more accessible for service providers. These locations were convenient for the majority of participants and had computer laboratories with both PC and MAC computers. Participants received copies of the course CD-ROM containing the 9 modules, and of *Children with disabilities* (Batshaw, 2002) as an additional resource text. In the first year, the course was offered twice using WebCT. In the last 2 years, the course was offered 4 times using Blackboard (reflecting the university-supported options for online course authoring systems).

Online discussions

Participants were required to participate in online discussions at least twice a week by posting questions and comments related to

Table 2. Key components of course

Component	Duration	Content	Process
Orientation meeting Week 1	5 h	Course content and expectations Pretest and enrollment WebCT or Blackboard	Review of syllabus Complete forms Training in computer laboratory
Online discussions (asynchronous)	13 wk	Course CD-ROM Small group discussion	Overview of 9 modules Challenges in serving infants with multiple disabilities and families
	1st wk	Working with families	
	2nd wk	Home visiting in early intervention	
	3rd wk	Early communication development	Submit analysis of <i>Purvi's story</i>
	4th wk	Sensory processing, part 1	Online quiz
	5th wk	Sensory processing, part 2	Online quiz
	6th–7th wk	Motor development and physical disabilities	Online quiz
	8th–9th wk	Visual impairments	Online quiz
	10th–11th wk	Hearing loss	Online quiz
	12th–13th wk	Infusing interdisciplinary strategies within daily routines	
Videoconference Week 7	1.5 h	Interdisciplinary perspectives on observations of 2 infants by course faculty and families	Small group discussion Submit reflection paper
Real-time text chat (synchronous)	once for 3/4 h (optional)	Issues related to interdisciplinary strategies and teaming	Small group discussion with all interdisciplinary faculty
Final meeting Week 16	5 h	Case studies and video segments Posttest and course evaluation	Students present case studies Discuss successes and challenges Complete forms and verbal feedback Submit <i>Jennifer & Brittany</i> analysis

the instructor's questions and to the evolving themes from threaded discussions on the module assigned for the specific time period. The purpose of these discussions was to facilitate communication across and within disciplines regarding selected topics and the problem-based cases or vignettes within each module contained on the CD-ROM. For example, in the discussion on home visiting, participants were asked about their approaches to home visiting and their experiences with making home visits with families with whom they did not share a common language. Besides the specific time-limited online discussions related to each module, a discussion forum named "Student Lounge" invited participants to post questions, strategies, and resources related to early intervention issues unrelated to the discussion topics and to ask questions about course assignments or logistics throughout the semester.

Videoconference session

About the seventh week of the semester, all 6 faculty members involved in the course participated in a 90-minute videoconference in the evening to discuss their observations based on video clips of 2 infants with multiple disabilities and their families. In the second year, parents were represented on the panel as well. Arrangements to downlink the one-way videoconference were made with school districts and other universities where participants were located throughout the state. Participants enrolled in the course, their professional colleagues, and other participants enrolled in other early intervention coursework viewed the videoconference at an assigned downlink site. In advance of the videoconference, viewers received a copy of PowerPoint slides and questions for small group discussions at the downlink sites.

Online quizzes

After much discussion, the faculty agreed that online quizzes would facilitate and reinforce participant learning of specific terms, concepts, and strategies for modules 4 through 8. Online quizzes were composed of

5 multiple-choice and true or false questions. Participants could log on at their convenience and complete the quiz within 30 minutes anytime during the designated week for each of these 5 modules.

Written assignments

Each participant was required to submit a written analysis of a case-based problem at the midterm and final weeks of the course. These assignments asked participants to demonstrate application of course content by analyzing the case and making specific recommendations. For example, the 2-page midterm case titled *Purvi's Story* described a family of well-educated parents from India, a 13-month-old daughter with visual impairments and medical needs born at 30 weeks' gestation, and their extended family members. Participants were asked to analyze *Purvi's Story* on the basis of (1) the issues and strategies related to family perspectives raised to Module 1 on working with families; (2) the multifactor model of home visiting discussed in Module 2 on home visiting in early intervention; and (3) caregiver-infant interactions discussed in Module 3, early communication development, and the role of caregiver-child interaction. They also had to identify the (1) strengths of the family, child, and intervention program; (2) challenges in serving this child and family; (3) critical information that was missing from the case; and (4) recommendations needed to change or enhance the current service delivery program. Participants submitted their individual analyses to instructors and were also encouraged to post and share their perspectives in online discussions.

Participants were also required to submit a reflection paper on the videoconference. This assignment was intended to engage participants in guided reflection by asking them to review what they learned from video and how identified issues, concepts, or practices applied to their own disciplines. Written reflections addressed (1) key issues raised related to recommended practices in teaming and interdisciplinary collaboration, (2) implications of

these issues and practices on one's own work in early intervention, and (3) questions or concerns based on the interdisciplinary panel and parent discussion. There were also online discussions about issues and questions raised by the videoconference.

Because participants were currently employed in early intervention, the majority elected the credit/no credit option in taking the course for professional development. Approximately one-third (34.2%) of the participants took the course as an elective in their master's program and they required a letter grade. These participants completed an additional assignment that involved the development of a comprehensive individual case study of an infant with severe or multiple disabilities. The case study described (1) the infant's age, diagnosis, and home and family situation; (2) the infant's abilities and needs in the areas of communication, motor, vision, hearing, and sensory processing; (3) the family's current intervention services; (4) recommendations for additional referrals or for improving teaming or coordination of early intervention services; and (5) recommendations for infusing interventions within the daily routine. Participants presented a summary of their case studies at the final class meeting.

RESULTS

The effectiveness of the online course as a mechanism for professional development was evaluated by asking participants to complete the following: (1) a self-evaluation form containing 15 competencies, which was used as pre- and posttests to assess changes in their perceptions of their own knowledge and skills; (2) a survey containing 15 items to indicate satisfaction with the overall design of the online course; and (3) a set of 3 open-ended questions regarding challenges and benefits of taking the course and its influence on their own practice. At the final class meeting, participants were also invited to share their learning experiences and comments on the course. Participants were also asked to evaluate the organization, logistics, and content of the ori-

entation and final meetings, and small group meetings for the videoconference after each event. In addition, a follow-up question was e-mailed to all participants at the end of the 3-year period.

Evaluation

The effectiveness of the course was evaluated through analyses of descriptive data sources. The pre- and posttest questions on the Self-evaluation of Course Competencies questionnaire asked each participant to rate his or her competency level on a list of course topics using a 5-point scale ranging from 1 (*not competent*) to 5 (*very competent*). An analysis of the pre- and postratings shown in Table 3, using a paired sample *t* test, revealed that participants indicated significantly greater ($P < .01$) understanding and perceived competence in *all* areas at the end of the course.

A satisfaction survey was administered at the end of the course. This survey contained 15 items regarding participants' satisfaction with the course content, as well as the online course delivery format and technology. Participants were asked to rate items using a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). As shown in Table 4, there was a wide range of individual ratings. However, mean ratings on the survey indicated that participants were most positive about the ease of navigating the course site and in their increase in knowledge and skills. They strongly agreed with items related to benefits of the online format, to increased skills in working with infants with multiple disabilities, and to the quality of instruction from both the primary and discipline-specific instructors.

Feedback from each cohort of participants on the satisfaction survey and on open-ended questions was used to make course modifications for the following year. Course content in each module was updated each year and additional video clips were included resulting in the final and current version of the CD-ROM (Chen, 2008). Some participants in the first cohort requested a real time chat

Table 3. Comparison of pre- and posttest self-evaluation on course competencies ($N = 110$)^a

Competency	Pretest	Posttest ^b
Ability to provide early intervention services	3.58	4.17
Understanding of processes and roles of members of an interdisciplinary team	3.84	4.65
Understanding family issues related to having an infant who has multiple disabilities	3.60	4.52
Ability to use a variety of home visiting service delivery models	3.40	4.27
Understanding of early communicative development and the role of caregiver-infant interaction	3.59	4.54
Knowledge and understanding of various disciplines in early intervention services with infants who have multiple disabilities	3.05	4.11
Knowledge and understanding of physical therapy	3.23	4.21
Knowledge and understanding of occupational therapy	3.34	4.21
Knowledge and understanding of visual impairment	2.84	4.01
Knowledge and understanding of hearing loss	2.82	4.01
Understanding of early intervention strategies related to a variety of disciplines	3.11	4.13
Understanding of early intervention strategies related to motor development	3.43	4.36
Understanding of early intervention strategies related to self-regulation and sensory processing	3.32	4.07
Understanding of early intervention strategies related to visual impairment	2.85	4.02
Understanding of early intervention strategies related hearing loss	2.85	4.05

^aFive-point scale: 1 (*not competent*), 3 (*somewhat competent*), 5 (*very competent*).

^b $P < .01$.

(synchronous discussion) with the team of interdisciplinary faculty. This option was implemented during subsequent years and a small number of participants (4–6) participated in each of these discussions. Although participants valued the videoconference as an opportunity for a face-to-face small group meeting, a few participants had difficulty locating a convenient downlink site and coordinating their schedules with the transmission of the conference as indicated on evaluations of the videoconference. The second year of the project, the videoconference was taped and distributed to participants in the third year so that they could plan a convenient time to get together to view and discuss the interdisciplinary observations and comments of course faculty. On the basis of participant feedback, the tape of the videoconference was edited and formatted to a DVD (Chen & Klein, 2007).

At the last class meeting, participants were asked to provide written responses to 3 open-ended questions:

1. How has what you have learned influenced your early intervention practices?
2. What were the challenges or difficulties in taking the course?
3. What were the advantages and benefits of taking the course?

The first and third authors reviewed written responses to these questions and analyzed their content to identify themes in the responses. The following themes were identified in the most frequent responses.

Influence on practice

Participants identified main influences of the course on their practices: (1) having a basic understanding of early intervention practices across disciplines (68.2%),

Table 4. Student ratings on satisfaction survey ($N = 110$)^a

Evaluation items	Average	Range
The online course site was easy to navigate	4.76	4-5
The online discussion enhanced my learning	4.36	3-5
I had plenty of opportunities to get feedback from the instructor online	4.58	1-5
I had plenty of opportunities to interact with the instructor outside of class (e-mail, phone, etc)	4.33	1-5
It was difficult to establish a relationship with other students online	3.31	1-5
As a result of this class, my skills related to working with infants with multiple and low incidence disabilities and their families have increased	4.70	3-5
I spent more time on this class than I have in most of the on-campus classes I have taken	3.39	1-5
I learned just as well in an online class as I do in a traditional classroom course	3.80	2-5
I missed the face-to-face interaction with the instructor	3.45	1-5
I had difficulty setting aside time each week to go online	2.80	1-5
I would consider taking another online class	4.32	1-5
This class has made me feel more comfortable in using the Internet	3.84	1-5
The Blackboard Technical Support was very helpful	3.95	2-5
I learned a lot from my primary course instructor	4.51	1-5
I learned a lot from the interdisciplinary faculty in the online discussion	4.64	2-5

^aFive-point scale: 1 (*strongly disagree*), 2 (*somewhat disagree*), 3 (*neither agree nor disagree*), 4 (*somewhat agree*), 5 (*strongly agree*).

(2) using routines-based assessment and intervention (61.6%), (3) appreciating family culture and beliefs (36.3%), (4) finding ways to collaborate with families (27.5%), and (5) using family-centered practices (23.1%).

Challenges

Participants identified very few disadvantages or challenges in participating in the course. Some participants identified technology-related issues, that is, logistics for videoconference, accessing video clips, use of the CD-ROM, and threaded discussions on the course Web site (25.3%) and taking quizzes online (13.2%), as somewhat difficult. Most of these challenges were related to some participants who tried to locate the answers to the quiz in the specific module on the CD-ROM while they were taking the quiz online. Some participants reported test-taking anxiety even though they had 30 minutes to answer 5 multiple-choice or true or false questions and could easily refer to notes or

a hard copy of the module for the answers. This course was the first online instructional experience for the majority of participants and some were just developing e-mail and other computer skills.

Advantages and benefits

Participants indicated 2 major advantages of participation in this course. First, access to practical information related to working with families and their infants who have multiple disabilities and to professionals (colleagues and instructors) across the disciplines (62.7%) was a rare resource for most of these service providers. Second, the convenience of an online, low-tech course fits the lives of working adults with families (52.8%).

Follow-up survey

At the end of the 3-year project, a follow-up questionnaire was e-mailed to the 110 participants who completed the course. The follow-up question asked, “As a result of participating

in the course *Interdisciplinary Strategies for Working With Infants With Multiple Disabilities and Their Families*, have you changed any of your early intervention practices? If so, how?" About 20% of these e-mails were returned as undeliverable and only 22 responses (24.2%) were received within the response period. Respondents reported an increased effort in coordinating with other disciplines and application of course content, particularly related to home visiting practices, considerations of sensory processing issues, addressing sensory impairments, and strategies to enhance early communication skills and routines-based intervention.

DISCUSSION

Findings related to course effectiveness and application of recommended early intervention practices are limited to self-report and the participants' perceptions of their own changes in knowledge and skills. Following the training, participants perceived themselves to be significantly more knowledgeable in all areas targeted by the project, including increased understanding of intervention practices across disciplines, in-home service delivery for families of infants with multiple disabilities, and interdisciplinary teaming. In particular, participants reported the greatest increase in their knowledge related to working with infants who had visual impairments and hearing loss. This finding is not surprising given the small number of participants representing disciplines related to sensory impairments.

This professional development course was implemented with 6 cohorts over a period of 3 years. During that time, each new cohort of participants seemed more computer literate than the previous ones. Similarly, the instructors increased their comfort level and skills in teaching online. Although evaluation results support participants' comfort levels with online instruction as a training delivery option, based on discussions and participant comments on evaluations of the orientation and debriefing meetings, instructors and participants alike continued to emphasize the impor-

tance of the face-to-face meetings at the beginning and at the end of each course.

It was also the authors' perception that participants benefited from the online interdisciplinary discussion and problem solving around the assigned vignettes in each module. Particularly for those participants whose own practice took place largely in isolation, threaded discussions exposed them to the benefits of participation in online discussions of problem-solving vignettes participating in a "community of practice" (Wesley & Buysse, 2001) among service providers across and within disciplines. On their course evaluations, a few participants who were the only early interventionists in their rural areas indicated that online discussions provided the collegial support that was absent from their own work situations. Similarly, some discipline-specific early interventionists (ie, speech-language pathologist and nurses) indicated that they appreciated the opportunity to interact with other early interventionists with the same disciplinary backgrounds.

These online opportunities for reflection enabled discussion of alternative solutions to a problem as viewed through the perspectives of various disciplines, as well as the infant's family. These simulations of interdisciplinary collaboration, as practiced via the course vignettes in each module, may have helped participants define and clarify disciplinary roles, thus creating a more cohesive model of early intervention services in their own practice. It is interesting that in many ways, participants' feedback expressed an appreciation for the opportunities to interact with other disciplines in the course, not just to gain information about other disciplines. These opportunities were provided in many ways, including (1) threaded discussions with peers representing a wide variety of disciplines; (2) ongoing opportunities for inquiry and reflection guided by discipline-specific faculty, each of whom had not only significant expertise in his or her own discipline but also in working with infants and families; (3) opportunities for 3 face-to-face interactions: the orientation meeting, the small group

videoconference meeting, and the final debriefing meeting.

As found in another online professional development course (Chen et al., 2008), participants in this course also preferred enrolling with colleagues from their own early intervention agency and opportunities for face-to-face interaction. This way the interdisciplinary issues and concerns raised in online discussions could be discussed on the job with relevant disciplines and practices could be modified if needed. Similarly, although online instruction has been found to be effective and convenient particularly for working adults, early intervention service providers valued the face-to-face interactions at the initial and final traditional class meetings and the small group meeting for the videoconference.

IMPLICATIONS FOR PROFESSIONAL DEVELOPMENT IN EARLY INTERVENTION

Providing high-quality early intervention services to families and their infants with multiple disabilities can present many challenges. Their complex needs cannot be effectively addressed by any single discipline, so multiple disciplines and several service providers need to be involved. Moreover, as is so very obvious to families, but sometimes not to practitioners—the “personhood” of the infant, that is, who that infant is, the whole child, is always more significant than the sum of the infant’s developmental areas. These “ar-

eas” or developmental subsystems related to self-regulation, emotional development, motor skills, sensory processing, and social communication, interact with and influence one another in complex and important ways. The need for early intervention practitioners to develop a familiarity with the working knowledge of the various disciplines is critical for both preservice training and professional development.

However, in many communities, early intervention services for infants with multiple and complex disabilities are provided by individuals, isolated service providers, and/or by personnel from many different agencies, rather than by coordinated interdisciplinary teams. Such a fragmented model creates serious structural barriers to efficient and effective service delivery. This can result in duplication, contradiction, competing interests, and conflict that may also contribute to significant and unnecessary stress for families. Therefore, the need for collaborative, interdisciplinary service delivery is essential. Although individual service providers may not easily address structural barriers, training programs for early interventionists may be able to play a role by providing preservice and inservice training in which practitioners gain an understanding of the perspectives and expertise of various disciplines and develop skills and dispositions that can support interdisciplinary collaboration and teaming. A solution to meeting this area of professional development seems to lie in a combination of both face-to-face interactions and online technology.

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