

## Chapter 2: Audio-based Distance Education

### Overview

Audio-based instruction for teacher education includes radio broadcasts; Interactive Radio Instruction (IRI); one- and two-way audio instruction; and, increasingly, podcasts.<sup>9</sup> This chapter examines the most prevalent forms of audio- (or aurally) based distance education. Like print-based education, *radio broadcasts* have been directed mainly at teachers. Content is created for teachers, and formal teacher learning occurs outside the classroom. In contrast, the primary audience for IRI and two-way radio has been students, with teachers as a secondary audience (if at all). Content is designed for students, and the primary locus of learning is the classroom. However, research on IRI in particular has demonstrated that teachers as well as students benefit greatly from classroom-based audio instruction.

More than print-based instruction, audio instruction has proved to be a successful means of conveying information to teachers, particularly in areas of conflict, areas marked by difficult terrain, and remote and isolated locations. Because it is a broadcast technology, new listeners can be brought on board at very low unit costs.<sup>10</sup> Furthermore, radios and audiocassette and CD players are easy-to-use, widely available technologies, even in the poorest corners of the globe.

This chapter examines two-way radio, broadcast radio, IRI, and interactive audio instruction (IAI) as modes of distance learning for teachers. Podcasting, though an audio-based technology available via the Internet and portable media players (MP3 players, iPods, etc.), will be examined in “Chapter 7: Mobile Technologies for Distance Learning.”

### Two-Way Audio

Two-way audio provides instruction, content, and resources to students and teachers in isolated and hard-to-reach locations with little communications infrastructure. Unlike one-way audio instruction, two-way audio allows back-and-forth communication between the teacher and students.

One of the earliest examples of audio-based distance education comes from Australia. In the 1950s, Australia’s Schools of the Air (SOA) began using two-way audio high-frequency radio transceivers to send and receive lessons and messages to and from students in the Northern Territories and Western Australia. Students interact with teachers at a studio (broadcast) site and with other students around Australia at regularly scheduled times during the day (Australian Government, n.d.). In some cases, students work alone using their high-frequency radio and printed material; sometimes they work with a tutor face-to-face; and in other cases, SOA provides access to curricula and instruction in remote primary and secondary schools where teachers may not be certified to teach a particular content area, or where curriculum and materials may be lacking.

9 Though an audio format, podcasting for teacher education will be discussed in “Chapter 7: Mobile Technologies for Distance Learning.”

10 The World Bank estimates that IRI’s annual recurrent costs per pupil average between \$1 and \$2US.

In recent years, SOA has supplemented two-way radio instruction with additional technology such as video cameras, Internet access, and interactive whiteboards (IWBs), enabling teachers at the studio sites to give lessons via satellite to learners who have Internet access. Students can watch and respond in real time via web cameras attached to their computer or via synchronous collaboration tools, thus providing greater interactivity between students and teachers, among students in varying remote locations, and between students and the learning material. As well as providing two-way audio and video, students can e-mail teachers and each other, interact with the IWB, and answer pop-up questions. They can also hear their classmates and participate in live group discussions (Australian Government, n.d.). Even with the expansion of other technologies, audio-based instruction has continued in Australia's Learning and Teaching in Schools program, an Internet- and satellite-based project for schools in the Northern Territories, and in its Virtual Schooling Pilot in Queensland (Wenmoth, in Naidoo & Ramzy, 2004).

Many types of distance-based professional development programs lack a strong research base demonstrating their impact on teacher knowledge and practice. This deficiency appears to hold true for SOA too. Investigation of the two-way radio model demonstrates learning benefits for *students*; however, our research on SOA did not yield any studies showing improved benefits for participating teachers in remote schools. Nevertheless, there is mention of improved benefits for tutors, parents, and the community. Given the impact of other types of classroom-based dual-audience distance approaches on teachers' content and pedagogical skills—such as IRI, instructional television, and virtual classrooms (to be discussed later in this guide)—it is logical to infer that similar benefits accrue to teachers from a well-implemented two-way audio program. At this point, however, such an assertion is based on extrapolation, not evidence.

## Broadcast Radio

Radio—both broadcast and interactive—has been a commonly used model for distance-based teacher instruction, primarily in terms of upgrading existing teachers' content knowledge skills. As a teacher training tool, radio is especially effective in countries where it is already a common technology; where radio listening is a primary source of entertainment and information and television is often unavailable, at least outside the capital city; where existing radio infrastructure is present; where Internet connectivity, computers, and computer-literate teachers are in short supply; and where radio can substitute for the absence of a well-developed and widely distributed corps of teacher trainers and professional development opportunities.

Throughout the globe, a number of entities have developed broadcast radio programming specifically for teachers. From 1998 to 2006, the USAID-funded and EDC-developed *Pas à Pas* radio series in Guinea developed 15- and 30-minute weekly radio segments to help teachers understand content-related concepts in math and science, as well as varied instructional approaches and communication strategies for students. Unfortunately, listenership was low, as broadcasts occurred during the main market day.

*Fastele! Fastele!* is a 15-minute radio program initiated by Zambia's Ministry of Education in 1999 to enhance teachers' skills and support their continuing professional development. Every broadcast consists of three parts: (1) a radio drama based on an educational topic; (2) informative interviews based on the topic of the drama; and (3) the sharing of teaching tips. *Fastele! Fastele!* is broadcast twice each week and

targets teachers who are already certified. The episodes are also available on CD-ROMs in teachers' resource centers.

In 1975, Indonesia, an archipelago of some 17,500 islands, initiated DIKLAT SRP, an in-service radio broadcast program, to help primary school teachers in 21 provinces understand how to use Indonesia's new curriculum. The program was administered by Indonesia's Center for Information and Communication Technology for Education (PUSTEKKOM) and used a curriculum developed by Indonesia's Open University.<sup>11</sup> In 1990, teachers participating in DIKLAT SRP were required to complete six learning packages over three years. Packages focused on content (e.g., Indonesian language, science, mathematics, and social studies), curriculum and instruction, and additional topics such as basic education and educational psychology. Teachers were given a paper-based test at the end of each package. Those who passed the test with a score of 56 received a Certificate of Accomplishment worth two credits and counting toward teachers' promotion and receipt of their Diploma II.

One hundred and sixty radio programs were broadcast twice daily (a morning edition repeated in the evening) six days per week, except holidays. Teachers, organized in learning groups under the coordination of the school principal, first read their printed materials. They then listened to that day's 20-minute radio broadcast on a government-issued radio/tape player provided to each school. Broadcasts were followed by a 10-minute discussion facilitated by the school principal, who was trained in the face-to-face Primary School Teachers' Development Project.

DIKLAT SRP provided no school-based follow-up, though it did offer twice-yearly monitoring by PUSTEKKOM through its regional offices. Listenership and fidelity data, that is, the percentage of teachers who actually followed the prescribed sequence of reading-listening-discussing, are not available. In 1990 the government upgraded teachers' minimum qualifications to Diploma II and upgraded DIKLAT SRP into Diploma 2 by Air. Content coverage of the program increased; printed supplementary material was expanded, and participants had to register as Diploma II students. Evaluation of DIKLAT SRP teachers indicated no "significant" difference between the skills of teachers who went through face-to-face professional development and those receiving professional development via radio (Sadiman, 1999).

One form of radio broadcast—soap operas or novellas—has been employed successfully in other sectors, such as public health and agriculture, to reduce high-risk behavior or promote positive behaviors. The "edutainment" value associated with radio novellas, their proven persuasive ability to influence behavior, and their capacity to diffuse information in a social and engaging way, would suggest that radio novellas are worth exploring in some capacity as one of a number of formal teacher learning tools.

#### Figure 2.1: "Just-in-Time" Professional Development

The just-in-time inventory strategy is used in business to improve the business's return on investment. It involves ordering materials as close as possible to the actual time of need.

**Just-in-time professional development** applies this strategy to education by providing instruction or professional development in a particular strategy as close as possible to the teacher's actual implementation of the strategy. Doing so creates "low latency"—little time lag between learning and implementation.

11 See <http://www.ut.ac.id/>.

## Interactive Radio Instruction (IRI)

More promising and better researched than broadcast radio is the impact of IRI on teacher practice. IRI is an instructional approach that uses *one-way radio* to reach *two audiences* (students and their in-class teachers). In this dual-audience, direct-instruction approach, the teacher is not “live” (as in SOA) but prerecorded. Once the in-class teachers turn on the radio, the radio “teacher” delivers content and orally directs the in-class teachers to apply a variety of interactive instructional approaches within their classrooms. Both the content and activities of the radio program are based on the national curriculum and use a series of structured learning episodes in which students are prompted to sing songs, participate in individual and group work, answer questions, and perform certain learning tasks. Regular IRI broadcasts offer curriculum developers the opportunity to scaffold instruction across a series of episodes and to model activities—such as short experiments using locally available materials—that can be completed by teachers and students between broadcasts. The approach is interactive, because the radio “teacher” speaks to students and students respond to radio prompts and interact with materials and with one another at the radio’s prompting (Gaible & Burns, 2007).

IRI has been successfully used since the 1970s in many areas of Africa, the Caribbean (such as Haiti and the Dominican Republic), Latin America, and Asia, where human and financial resources are few. IRI has proved to be an inexpensive, portable, one-to-many technology that requires minimal training to use and is aligned with traditional oral means of imparting information.

One of the best-known and longest-running examples of IRI was South Africa’s Open Learning Systems Educational Trust (OLSET)’s *English in Action*. Like all IRI, the program was aimed at a dual audience: students and teachers. From 1993 until its closure in December 2009, 52,000 teachers and nearly two million primary school students in nine South African provinces improved their English-language speaking and writing through radio-scaffolded active learning, games, and group work (Potter & Naidoo, 2009; OLSET, 2010). While the program began as a form of teacher in-service education, it was extended to include pre-service teachers, in spite of mixed evaluation results.

As a model of pre- and in-service distance education, IRI exhibits many best practices in professional development that provide demonstrable teaching and learning benefits (Bosch, 1999; Evans & Pier, 2008; Gaible & Burns, 2007):

- » **Highly scaffolded just-in-time professional development.** Radio provides structured, in-class, job-embedded teacher professional development. Teachers and students react verbally and physically to prompts, commands, questions, and exercises posed by radio characters. Though the approach is often highly behaviorist, over time teachers, through ongoing replay of broadcasts, learn how to perform a set of instructional activities well (see figure 2.1 for an explanation of just-in-time professional development).
- » **Uses formative assessment.** IRI owes much of its success to the practice of continual formative evaluation. IRI programs are evaluated throughout the life cycle of the IRI project to gauge student interest, participation levels, and skills development. Evaluation occurs in part through the process of audience research during piloting phases and through periodic interviews, observations, and

guides after the program is launched. Where problems are found, they are corrected. Evaluation of IRI makes the programs responsive to student and teacher needs (Dock & Helwig, 1999; Bosch, 1997).

- » **Proven impact on teachers' instructional practices.** Because of its scope, IRI can provide structured support to primary teachers throughout a country, even those in the most isolated regions. It can help teachers implement active, intellectually engaging instructional practices generally associated with competency-based instruction, while at the same time ensuring that students learn more effectively (Evans & Pier, 2008). When supplemented by music, text, games, and resources, IRI guides teacher and student through a series of differentiated learning activities and can encourage teachers to adopt more engaging, student-centered teaching strategies to teach specific outcomes and subject areas (Evans & Pier, 2008).
- » **Proven impact on teachers' content knowledge and content-based pedagogical knowledge.** IRI's impact on teacher learning has been extensively documented. Radio instruction, both for students and adults, has proved effective in offering basic content knowledge to adults as well as children (Perraton, 1993), particularly when combined with print and supported group study. Indeed, most studies of IRI show greater benefits for IRI learners than for conventional classroom learners (Potashnik & Capper, 1998). As a result of IRI, the number of teachers in Madagascar's *Appui Technique aux Édicateurs et Communautés* project (2006–2007) using targeted active learning behaviors rose from 58 percent to 96 percent (Evans & Pier, 2008).
- » **Changes in teacher attitudes and dispositions.** Anecdotal evidence of IRI's impact on teachers' attitudes is strong, with teachers in many programs stating that IRI has increased their motivation, enabled them to overcome embarrassment at their lack of subject mastery, changed their approaches to teaching and learning, and made them more gender-sensitive in their classrooms (Hartenberger & Bosch, 1996; Bosch, 1999; Burns, 2007b).

**Figure 2.2: Behaviorism Versus Constructivism**

**Behaviorism** is a philosophy of learning that emphasizes the importance of behavior, as opposed to consciousness and experience, in learning. Under its original definition by the American psychologist John Watson, the emphasis was exclusively on reflexes and conditioning. In a behaviorist paradigm, learners are environmentally conditioned: the teacher creates a learning environment that elicits certain behavior and controls learning by predicting and directing learning outcomes. The learner assumes an active role in learning, practicing the new behavior and receiving feedback that reinforces the behavior.

In contrast, **constructivism** is a philosophy of learning that emphasizes learning through experiences and consciousness. Within a constructivist paradigm, learning is a quest for understanding and meaning. The learner actively constructs knowledge by interacting with a variety of experiences, resources, and individuals. The role of the teacher is significantly different than in a behaviorist paradigm. In a constructivist paradigm, the teacher designs learning experiences that promote inquiry, exploration, and problem solving. The teacher is a facilitator, who guides and supports learners as they construct knowledge.

These philosophies of learning shape instructional design and in turn the ways in which teachers teach and students learn.

## Interactive Audio Instruction (IAI)

A number of other audio-based technologies can be used to extend the reach of broadcast and interactive radio, both of which are highly vulnerable to broadcast interruptions, to teachers and students in remote areas. For example, lessons and instruction can be recorded on audiocassette or CD-ROM and provided to schools—a practice sometimes known as “narrowcasting” (Cumming & Olaloku, cited in Perraton, 1993). This approach occurred extensively in Guinea’s 1998–2006 Fundamental Quality and Equity Levels project when government funding for IRI broadcasts ceased. Teachers audiotaped radio broadcasts and created and shared vast libraries of the popular IRI program *Sous le Fromager*. Using audiocassettes and CD-ROMs, teachers were able to schedule lessons conveniently; replay lessons; and use the *stop*, *pause*, and *rewind* features of audiocassette recorders and CD players to re-examine a particular piece of information. This recording and use of IRI onto other types of audio formats is known as IAI.

In 2007, USAID’s Decentralized Basic Education 2 (DBE 2) program introduced IAI in 113 Indonesian kindergartens in seven provinces to enrich the quality of preschool learning. The DBE 2 IAI kindergarten initiative is a pilot program that consists of an audio and print-based materials package for participating schools as well as a series of teacher training activities. Using a series of 106 interactive, innovative lessons recorded on audio CD, the IAI program both guides and supports the daily instruction of an entire year of the Indonesian kindergarten curriculum through a series of in-class audio programs. The program aims to enhance the quality of kindergarten teaching and learning and improve school readiness in the following ways:

- » Providing high-quality content that follows the national kindergarten curriculum
- » Simultaneously training teachers and teaching students
- » Facilitating an active learning-based approach with every lesson

There are three types of audio programs, though they all follow the same structure: an introductory program, core programs, and review programs. Teachers are expected to complete three audio programs a week with their students.

Figure 2.3 outlines the materials used in the kindergarten IAI instruction. The printed teacher’s guide is designed to help teachers prepare for each audio lesson and contains information detailing the basic competency each audio lesson addresses; indicators to help teachers assess student achievement and self-progress; instructions and suggestions on what to do before, during, and after the audio program; and lyrics for all songs included in the program. To familiarize teachers with IAI, DBE 2 also provided a series of two 2.5-day teacher training workshops.

**Figure 2.3: DBE 2’s kindergarten program in Indonesia**

The DBE 2 kindergarten materials package includes everything a teacher needs in order to use the IAI program in her classroom:

- CD player and batteries
- Teacher’s guide
- Four posters
- Student worksheets
- Number and letter cards
- Scissors and crayons

EDC has conducted extensive evaluation of its Indonesia IAI kindergarten program. Pre- and post-test administration occurred in the 2007–2008 academic year, with the post-test conducted following instructional delivery of the first of two IAI series. Learners were assessed in the areas of language, cognitive development, and physical and psychomotor development (Ho & Thukral, 2009). Figure 2.4 displays the results of these comparisons, as well as additional general information about the program. Though figure 2.4 focuses on kindergarten students, what it really demonstrates is that the IAI positively affected *teachers'* literacy instruction for their young learners.

**Figure 2.4: Overview of EDC's Indonesia Kindergarten IRI Program**

<b>Number of teachers participating in IAI (2007–2009)</b>	399
<b>Number of students participating in IAI (2007–2009)</b>	6,071
<b>Length of program</b>	106 audio programs (each 35–40 minutes in length)
<b>Program structure</b>	<p>The 106 programs are organized into four units:</p> <ul style="list-style-type: none"> <li>▪ Unit 1: Myself</li> <li>▪ Unit 2: My Family and My Community</li> <li>▪ Unit 3: My School</li> <li>▪ Unit 4: Animals and Plants</li> </ul> <p>All audio programs contain the following components:</p> <ul style="list-style-type: none"> <li>▪ <b>Presentation/introduction segment.</b> The teacher and children are welcomed to the program and the basic competency and materials needed are explained.</li> <li>▪ <b>Circle song.</b> Repeated in all audio programs, the circle song is used to organize the children in a circle and motivate them for the IAI lesson.</li> <li>▪ <b>Activities.</b> Each audio program has at least three activity segments: songs, games, a story, and physical activities responding to learning objectives.</li> <li>▪ <b>Evaluation.</b> Each program includes an evaluation segment, which instructs teachers to ask children what they liked most about the lesson.</li> <li>▪ <b>Closing.</b> Following a brief summary of the lesson, activities that can be done after the program are suggested.</li> </ul>

<p><b>Evaluation results for students (Ho &amp; Thukral, 2009)</b></p>	<p>IAI students meeting or exceeding school readiness requirements in</p> <ul style="list-style-type: none"> <li>▪ <b>Language and Cognitive Development:</b> 21 percentage points versus 13 percentage points (control kindergartners)</li> <li>▪ <b>Physical and Psychomotor Development:</b> 5 percentage points versus 2 percentage points (control kindergartners)</li> <li>▪ <b>Percentage of IRI kindergartners assessed as “above average” in language:</b> 7 percentage points higher than control kindergartners.</li> </ul>
<p><b>Primary distance learning modes</b></p>	<p>CD-ROM, print teacher's guides</p>

## Other Forms of Audio-based Distance Education

There are additional forms of audio-based distance education used for initial teacher formation and upgrading of skills. Digital radio, or digital audio broadcasting, can supplement regular broadcast radio, since it has the potential to increase access to radio signals, generally has lower airtime costs, and can expand the services that regular radio provides. Digital radio signals may carry any binary-encoded data, which means that digital radios can also transmit multimedia information to computers (Gaible & Burns, 2007: 44).

As with all modes of distance learning, the Internet is revolutionizing audio-based learning. Internet services such as DAR.fm<sup>12</sup> allow users to listen to and record any AM/FM program in the United States—a service that will undoubtedly expand to other countries. Web 2.0 tools such as Broadcastr<sup>13</sup> allow users to upload recorded stories and organize them by geographic location. These stories can then be accessed via Internet radio and smart phone and Android tablet applications. “Radio browsing” has been used in Bhutan and Sri Lanka as part of community radio projects. Funded by UNESCO and administered by the Bhutan Broadcasting Service and Kothmale Community Radio, radio browsing combines the broadcast capacity of radio with the information retrieval capacity of the Internet to provide tailored assistance or instruction on local issues according to local requests for assistance (PricewaterhouseCoopers, 2010). It is typically used in rural communities where Internet access is unavailable. Listeners to a particular radio program ask radio broadcasters<sup>14</sup> to find out specific information, which is then broadcast on the radio program. The Virtual University of Pakistan uses *Virtual University Radio (VUP)—Sound of Knowledge*, a Web-based radio program that delivers educational and informational content to Pakistani teachers and citizens in general (PricewaterhouseCoopers, 2010).

12 See <http://dar.fm/>

13 See <http://beta.broadcastr.com/>

14 It is not clear by what means they ask.



## Phones and Audio Conferencing

Formally and informally, teachers have for decades used phones to share information with peers and for professional development (especially through teacher “help lines”). Phone-based professional development has often been combined with radio broadcasts (Zambia) and television broadcasts (Indonesia), in which teachers call in to ask particular questions about use of a science kit or new instructional strategies.

Phone-based audio conferencing allows multiple parties of teachers to connect using either an audio-conferencing bridge system or external conferencing providers. Audio conferencing has significant benefits: it is synchronous, allowing teachers to communicate in real time; and it is simpler to use than other distance education media such as videoconferencing. Phones are a familiar medium requiring no or limited training. Audio conferencing has a long history in both instruction and teacher professional development. The American city of Baltimore, for example, uses audio conferencing as part of its Home and Hospital program, in which teachers instruct groups of students prevented from attending school by illness or other circumstances. Australia’s University of New South Wales has used audio conferencing since 1991 as the primary means of communication between teachers and students in 20 learning centers across the country.

Like most modes of distance education, audio conferencing has increased in popularity because of the Internet. Free Web-based audio-conferencing programs allow users to communicate orally at no cost from computer to computer using a headset, from computer to phone via free Internet telephony applications such as Skype,<sup>15</sup> or from phone to phone using free audio conferencing such as ConferenceUp.<sup>16</sup> Other free phone-conferencing tools such as Google Voice,<sup>17</sup> Group Me,<sup>18</sup> and Rondee<sup>19</sup> combine text- and voice-based services. Wiggio<sup>20</sup> is a free group management service that allows conference calling and helps users plan projects, send mass text messages, and take polls within groups. It also enables users to streamline voice and e-mail communication; set up virtual meetings; and combine screen share, a shared whiteboard, file trading, and videoconferencing options with a conference call—features that make it a potentially powerful teacher learning tool.

The power of this type of real-time communication is invaluable for teachers who benefit emotionally and intellectually from talking in real time to a colleague, an instructor, or a group of peers. The University of

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15 See <http://www.skype.com>

16 See <http://conferenceup.com/>. *Conference Up* allows conference calling by telephone, but calls are routed through the Internet.

17 See <https://www.google.com/voice>

18 See <http://groupme.com/>

19 See <http://www.rondee.com/>

20 See <http://wiggio.com/>

the West Indies, one of the major providers of pre-service education to 13 island states in the Caribbean,<sup>21</sup> uses audio conferencing to link its various campuses and learning centers as part of its Bachelor of Education programs, though it is severely reducing this focus on synchronous communication in favor of more asynchronous communication.

The Internet and mobile technologies are transforming all forms of audio-based learning. Podcasts have become an increasingly common and useful tool in the audio-based teacher professional development repertoire because of their versatility and portability. Teachers can listen to them on MP3 players, such as the iPod; smart phones, such as the iPhone or Blackberry; personal digital devices, such as the iPod Touch; and via the Internet. Numerous support services are being developed to support audio-based learning. For example, Google Listen<sup>22</sup> allows users to do voice searches for audio files and to subscribe, download, and stream these files onto Android-enabled cell phones to create personalized “audio magazines.” Podcasting will be discussed in greater length in “Chapter 7: Mobile Technologies for Distance learning.”

### Considerations: Audio as a Distance Learning Tool

Audio-based distance learning has been a fixture in the global distance education landscape since the 1970s, when IRI was developed by Stanford University. Radio and audio are simple technologies with which many teachers across the globe are familiar. Schools don’t need to purchase computers or Internet connectivity, and teachers do not need to learn complex technology in order to participate in audio-based professional development. Audio-based, oral learning is a culturally familiar medium that doesn’t require the reading and writing skills needed to undertake print-based instruction or the technology skills demanded by online learning—requirements that often prompt teacher attrition in distance education programs.

Audio offers both strengths and weaknesses as a distance learning mode for teacher education. Teachers learn when they can communicate and collaborate frequently in real time; hence any distance education initiative should build in opportunities to allow learners to discuss and reflect with one another through phone or audio conferencing. (Teacher reflection and technology accommodations for this will be discussed throughout this guide.) Recorded audio files of professional development sessions, particularly content, can be archived on CD-ROMs or audiocassettes, allowing teachers to access these materials for self-study or additional refreshers.

Audio-based instruction—particularly in the two radio broadcast programs profiled in this chapter (Diklat SRP and *Pas à Pas*)—has suffered from weaknesses that have diminished its effectiveness as a mode of distance-based professional development. These weaknesses reveal important lessons that must be built into audio-based distance education in particular and into any type of distance-based professional development in general.

21 UWIDEC operates out of three campuses: Barbados, Jamaica, and Trinidad. In addition to face-to-face and distance instruction in education for pre- and in-service teachers on these three islands, UWIDEC offers distance-based education to pre-service teacher-candidates in 13 other island nations or dependencies: Anguilla, Antigua and Barbuda, the Bahamas, Belize, British Virgin Islands, Cayman Islands, Dominica, Grenada, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent, and the Turks and Caicos Islands. See <http://dec.uwi.edu/projects/blend.php>

22 See <http://listen.googlelabs.com/>

- » **Interactivity is critical for engagement and learning.** As will be discussed shortly, *interactive* radio or audio has proved to be a more effective teacher training tool than noninteractive *broadcast* radio. Broadcast radio is essentially a single-channel, passive medium, making it easy for participants to “tune out.” Limited interactivity in turn limits learning outcomes. For example, Dakir & Simanjuntak (1999, cited in Sadiman, 1999) compared the performance of teachers in face-to-face professional development with those receiving professional development via broadcast radio and found no “significant” difference in the skills of these two groups. Studies of the impact of broadcast radio in Africa show similar results. In contrast, the multichannel involvement, participation, and engagement—learner with content, learner with facilitator, learner to learner, and learner with technology—that are characteristic of IRI provide tangible and measurable results showing that teachers in IRI-/IAI-based training often perform as well as their peers in face-to-face trainings (Bosch, 1997) and in some cases better.
- » **Monitoring and evaluation are key to assuring quality and measuring outcomes.** Radio broadcasting for in-service teacher professional development has often been termed “spray and pray.” Because many radio broadcasts for teacher learning have limited or no monitoring, school-based follow-up, or formative evaluation, such programs spur more questions than answers. For example, what percentage of teachers listens to the broadcasts at all or with any regularity? What percentage implements with fidelity what has been taught via broadcasts? When monitoring and coaching are provided, completion rates for radio-based distance learning increase. When these are not provided, completion rates decline (Perraton, 1993).
- » **The distance learning medium must be appropriate to goals for teacher learning.** Research on broadcast radio as a mode of teacher training appears to indicate that radio may have constrained teacher learning as much as it may have helped it. In Indonesia, for example, Gafur (1994, cited in Sadiman, 1999) states that teachers reported concerns about the quality and length of DIKLAT SRP programming, suggesting that episodes were too short and topics not sufficiently developed. Much of the content of the Diploma II curriculum (56 of 80 credits) could not be broadcast via either DIKLAT SRP or Diploma 2 by Air because radio was not a suitable medium for delivering more complex types of activities. In 2006 interviews with the author, a number of Guinean teachers stated that they couldn’t concentrate on the information presented in the radio broadcast program *Pas à Pas* because it was “boring,” and the French sometimes too formal and academic to follow.

In terms of research-based outcomes, the most valuable members of the audio distance education “family” are IRI and IAI. IRI’s main attractions are its reach, its cost, its school-based character, and its just-in-time nature. Where radio infrastructure is available,<sup>23</sup> the range of radio is formidable, reaching large numbers of teachers in geographically remote and isolated areas. The broad reach of radio means that more teachers can be trained, thus reducing the overall instructional unit cost per teacher. Because of its broadcast nature, new teachers can be added to existing programs with low marginal costs. Because teachers can listen to radio broadcasts or audio programs during the school day, schools do not need to worry about paying for substitute teachers, paying teachers’ travel to workshops, or losing class time for students.

23 Many parts of the world where IRI has been a fixture on the teacher professional development landscape (South Asia, Latin America, and sub-Saharan Africa) have well-developed radio and audio production capacity.

These advantages are enhanced when IRI and IAI are used as specific distance education delivery systems. First, IRI and IAI, unlike broadcast radio, are engaging and interactive, speaking directly to students and teachers. One critical advantage is that the teacher can receive just-in-time, classroom-based professional development.

Next, unlike other modes of professional development, IRI and IAI compensate for the learning curves required of a novice teacher with little degradation in the quality of instruction. For example, a teacher may learn how to use a science kit in a face-to-face or online session and must often then “muddle through” the first few times he or she attempts to apply what she’s learned in class. But because they are so highly scaffolded, IRI and IAI programs can direct the teacher through use of the new kit in a way that mitigates degradation of instructional quality. Third, related to this last point, IRI and IAI can serve as an in-class support for multiple types of professional development. Finally, IRI (especially) and IAI are backed by a body of rich, deep, and longitudinal research proving their effectiveness as a medium for both student and teacher learning.

### Summary of Audio-based Distance Education

Figure 2.5 summarizes the role of audio-based distance learning and its strengths and limitations as a distance education mode.

Figure 2.5: Summary of Audio-based Distance Education (adapted from Gaible &amp; Burns, 2007: 46)

Roles in Teacher Professional Development	Strengths	Limitations
<ul style="list-style-type: none"> <li>▪ It substitutes for or complements the in-class teacher as an instructor.</li> <li>▪ It provides a highly scaffolded form of professional development for teachers with weak literacy, content, and pedagogical skills.</li> <li>▪ It offers instruction in basic skills: math, health, language of instruction (English, French, etc.).</li> <li>▪ It promotes teacher development, primarily via demonstration, guided and hands-on classroom management, and building subject knowledge.</li> </ul>	<ul style="list-style-type: none"> <li>▪ It can lead to improvements in students' and teachers' basic skills.</li> <li>▪ It may be implemented with or without textbooks and other resources.</li> <li>▪ It can reach large student and teacher populations.</li> <li>▪ Lack of literacy skills is not a barrier.</li> <li>▪ It addresses equity and access issues (gender, ethnic, rural).</li> <li>▪ It can combine hands-on development of teacher skills with student learning.</li> <li>▪ Audio learning may support visualization and concept building by learners.</li> <li>▪ It enables instructional continuity across grades and subjects.</li> <li>▪ Radio is a known quantity in all countries, and radio production skills are widespread.</li> <li>▪ It is durable and survives extreme environments and long-term use with minimal care.</li> <li>▪ It requires only moderate classroom infrastructure and low technical support.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Value of content may degrade over time—long-running programs must evolve with schools and education systems.</li> <li>▪ Broadcast airwaves are subject to political and economic events and fixed broadcast schedules.</li> <li>▪ It has a tendency to reinforce rote learning models—interactivity may be limited, and attention to needs of individual learners is limited.</li> <li>▪ IAI/IRI may promote a linear, one-size-fits-all approach.</li> <li>▪ It risks student and teacher dissatisfaction, including boredom, especially when lessons are broadcast daily.</li> <li>▪ Hardware replacement programs are necessary: radios and batteries may be stolen or damaged.</li> </ul>

Roles in Teacher Professional Development	Strengths	Limitations
	<ul style="list-style-type: none"><li>▪ It aligns well with learning styles of oral cultures.</li><li>▪ IAI and podcasting largely facilitate portable and “anytime, anyplace learning.”</li><li>▪ Audio conferencing provides real-time shared learning and as-needed contact and instruction from an instructor and a group of peers.</li></ul>	