Basic Education Online

Identifying High-Quality Developmental Education and ESOL Courses for the Open-Content Environment

League for Innovation in the Community College

WITH SUPPORT FROM
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Cynthia D. Wilson
Project Director

The League for Innovation in the Community College is an international organization dedicated to catalyzing the community college movement. The League hosts conferences and institutes, develops web resources, conducts research, produces publications, provides services, and leads projects and initiatives with more than 750 member colleges, 100 corporate partners, and a host of other government and nonprofit agencies in a continuing effort to make a positive difference for students and communities. Information about the League and its activities is available at www.league.org.

The opinions expressed in this book are those of the authors and do not necessarily reflect the views of the League for Innovation in the Community College.

Requests for permission should be sent to
League for Innovation in the Community College
4505 E. Chandler Boulevard, Suite 250
Phoenix, AZ 85048
email: publications@league.org
Fax: (480) 705-8201

Copies of this publication are available through the League website at www.league.org or by calling (480) 705-8200.

Printed in the United States of America.

ISBN 1-931300-44-5

ACKNOWLEDGEMENTS

The League expresses deep appreciation to The William and Flora Hewlett Foundation for supporting open educational resources and the Basic Education Online Project, and to Marshall Smith and Catherine Casserly for their assistance throughout the process.

Many thanks, also, to members of the working groups and the advisory group who participated in identifying the criteria for high-quality courses in the focus areas. Thanks to Lisa Petrides, Anastasia Karaglani, and Lilly Nguyen at ISKME for their work on the literature review (see Part II), and to Ron Baker for serving as the project evaluator and providing feedback along the way.

Finally, thanks to the League staff for their work on the project, and a special acknowledgement to Matthew Milliron, whose technology expertise was invaluable in building the online version of the inventory and in retrieving and formatting the data from respondents.

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- Tools: Software to support the development, use, re-use and delivery of learning content including searching and organization of content, content and learning management systems, content development tools, and on-line learning communities.

- Implementation Resources: Intellectual property licenses to promote open publishing of materials, design principles of best practice, and localization of content.

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WORKING GROUP MEMBERS

Karin S. Alderfer, Miami Dade College, USA
Mark Alexander, Kapi'olani Community College, USA
Meribeth Allman, Anne Arundel Community College, USA
Rosemary Arca, Foothill College, USA
Jim Baker, Northland Polytechnic, New Zealand
Sara Baldwin, South Seattle Community College, USA
Bradley Beach, Gipps TAFE, Australia
Eva Bednarowicz, Humber Institute of Technology and Advanced Learning, Canada
Michael Coghlan, TAFE SA, Australia
Leigh Dooley, Kapi'olani Community College, USA
Ion Georgiou, Foothill College, USA
Christine Horgan, SAIT Polytechnic, Canada
Guy Kellogg, Kapi'olani Community College, USA
Philip Knighton, Anne Arundel Community College, USA
Linda Lane, Foothill College, USA
Maria Maspons, Miami Dade College, USA
Judy McKenzie, Lane Community College, USA
Elizabeth Propps, Central Piedmont Community College, USA
Susan Reddoor, Lane Community College, USA
Marisol Regidor, Miami Dade College, USA
Sherrie Seymour, Lane Community College, USA
Khaki Wunderlich, Tompkins Cortland Community College, USA

ADVISORY GROUP

Rose Asera, The Carnegie Foundation for the Advancement of Teaching, USA
Joe Aversa, Humber Institute of Technology and Advanced Learning, Canada
Larry Goldberg, Media Access Group at WGBH, USA
Robert H. McCabe, President Emeritus, Miami Dade College, USA
Cindy L. Miles, Community College of Denver, USA
Stella Perez, League for Innovation in the Community College, USA
Lisa Petrides, Institute for the Study of Knowledge Management in Education, USA
Alison Reid, Scottish Further Education Unit, Scotland
Nita Schultz, Victorian TAFE Association, Australia

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PART I

The Basic Education Online Project

In October 2004, the League for Innovation in the Community College was awarded a one-year grant from The William and Flora Hewlett Foundation to plan a project designed to make several "high-quality" courses available on the World Wide Web as open-content courses. The courses include developmental reading, developmental writing, developmental math, and English for Speakers of Other Languages (ESOL/ESL). The intent is for the selected open-content courses to become part of a free, online resource for teachers and learners throughout the world who seek instructional models or self-study options.

Open content refers to "any kind of creative work including articles, pictures, audio, and video that is published in a format that explicitly allows the copying of the information" (Wikipedia, 2005). Often, open content can be adapted or modified by its users. The open content movement in higher education is manifested in projects focused on sharing intellectual assets and making course content freely available for educational purposes. One of the best-known open-content projects, MIT's OpenCourseWare (OCW), has created "a free and open educational resource for faculty, students, and self-learners around the world" (MIT, 2005). OCW publishes MIT course materials for free access; however, the project "is not a degree-granting or certificate-granting activity" and "does not provide access to MIT faculty" (MIT, 2005).

Similarly, Foothill-De Anza Community College District's Sofia project makes community college courses "freely available on the web to support teaching and learning" (FHDA, 2004). The project "provides a vehicle for faculty to share their intellectual assets, gain wide recognition for their contribution to their profession, and play a key role in improving equal access to educational materials beyond their classes" (FHDA, 2004). Carnegie Mellon University's Open Learning Initiative is also making courses available in an open-content environment, thus helping "the World Wide Web make good on its promise of widely accessible and effective online education" (CMU, 2003).

Other projects providing open educational resources are also under way, including, for example, Harvard University's Open Collections Program "to increase the availability of

historical resources from Harvard's library and museum collections for purposes of teaching, learning, and research – both at Harvard and around the world" (Harvard, 2005). Utah State University's Open Learning Support (OLS) is "social software" that facilitates support for independent learners who, in open-content settings, have no access to traditional institutional support resources such as instructors, tutors, and academic support centers (USU, 2004).

Basic Education Online. The Hewlett Foundation's education program priorities include "using information technology to increase access to high-quality academic content" and "supporting strategies to provide effective universal basic and secondary education (UBASE) in developing nations" (Hewlett, 2002). The projects mentioned in the preceding paragraphs are among those supported by the Hewlett Foundation in addressing these priorities. Also supportive of these priorities, the Basic Education Online project's goal is to research and design a larger international project that will provide free universal online access to developmental reading, developmental writing, developmental mathematics, and English for Speakers of Other Languages courses. These courses will be available for use by individuals seeking self-improvement or by professional educators in need of high-quality resources in these program areas. The courses will be of use not only to higher education professionals in readiness enhancement programs, but also to educators and students in secondary schools that lack formal programs in these areas. In areas where students may not have opportunities for secondary or postsecondary education without basic reading, writing, and mathematics skills, these courses could provide access to self-directed basic education and ESOL resources. To help ensure access, the project included a focus on the use of assistive technologies and accessible instructional design in online courses.

Carnevale and Desrochers (2004) report that "increasing a country's average level of schooling by one year can increase economic growth by about 5 to 15 percent" (p. 39). In the United States, 42 percent of students who enter community colleges require at least one developmental education course, almost 15 percent speak a language other than English at home, and 11

percent of students report a disability (Wilson, 2004). The need for high-quality, accessible developmental education and ESOL courses is significant in the U.S., with its open-admissions community college system. In areas where educational access and attainment are more restrictive, the need may be even greater.

Project Design. The Basic Education Online Project included a series of activities designed to identify high-quality courses to be adapted or recreated for use in an online, open-content setting. The project sought first to define "high quality" in the context of these courses and to identify criteria for determining high-quality courses in the four content areas. These efforts were conducted through activities involving (a) an international panel of practitioners currently teaching in the various content areas; (b) an international group of experts and leaders in developmental education, ESOL/ESL, accessibility, and educational research; and (c) a review of research on effective practices in developmental education and ESOL/ESL. After the criteria were identified, the project solicited reaction from the field through an inventory developed using these criteria. The inventory was distributed to academic administrators at postsecondary institutions in Australia, Canada, Jamaica, New Zealand, Scotland, and the United States. Involving practitioners and scholars in determining and affirming the quality criteria, and in planning the large-scale project, was designed to acknowledge the experience and expertise of the field and to help ensure support for the project from the field.

The project then sought to identify high-quality courses for inclusion in the proposed project through a request for qualifications (RFQ) based on the identified criteria. Identifying institutions with high-quality programs through a request for qualifications was designed to provide a pool of colleges to participate in planning a large-scale project that can realistically achieve the goal of free, universal, online access to the resources. The findings of the Basic Education Online research and planning project, including the review of research and literature, the identified criteria, and the inventory results, are presented to the field in this report.

CRITERIA FOR HIGH QUALITY

Identifying Criteria. With a goal of identifying high-quality courses in developmental reading, writing, and mathematics, and in ESOL, the project's first objective was to define high quality by identifying criteria necessary for a course to be so designated. A project-commissioned literature review (see Part II) was designed to serve as one source of criteria, with practitioners serving as another source. Five working groups, made up of practitioners with experience and expertise in at least one of five areas – developmental reading, developmental writing, developmental mathematics, ESOL, and assistive technologies – were formed to identify the criteria for high-quality courses. The groups met asynchronously in a closed, password-protected online forum, responding to prompts from project staff and to posts by other group members. Working group participants were identified through a snowballing process that began with solicitation of nominees from League member colleges. Nominees submitted qualification statements and were selected by project staff based on their experience and expertise, as well as on project needs.

An advisory panel was formed to assist with the identification of the criteria as well as the development of both the inventory and the RFQ. Advisory panel members included educational researchers, experts in the various focus areas, and college leaders in those areas. Working group and advisory panel participants represented Australia, Canada, New Zealand, Scotland, and the United States. Throughout the project, efforts were made to ensure clarity among participants with varying educational systems and language usage.

Working Group Processes. Working group activity began with a request to each group for responses to a single question: What does high quality mean to you in the context of a high-quality developmental reading [or developmental writing, developmental mathematics, or ESOL, according to the group's focus] course? For the assistive technologies group, the question had slightly different wording: What does effectiveness mean to you with regard to the integration of

assistive technologies in an online learning environment? The five groups worked separately, but members were encouraged to lurk – read postings but not post responses themselves – in all groups. Participants were asked to respond to this introductory question and to other participants' responses as well. The ensuing conversations were thoughtful, and they provided a practitioner voice the project sought from this activity.

After one week of conversation, the project director, with feedback from the project evaluator, synthesized the comments made by each group and produced lists of criteria based on that synthesis. Each list was presented to its group for comment and revision, and the lists were revised accordingly. Working group participants were then directed to continue their conversation, adding, deleting, or altering criteria as the discussion warranted. After another week, the project director once again synthesized the comments and produced a second set of lists for working groups to review.

Revisions and clarifications were made based on working group feedback, and lists were sent to the advisory panel members for their feedback. Advisory panelist feedback was presented to the working groups, who then spent a week reacting to that feedback, either by incorporating it directly into their criteria lists, revising it and then incorporating it into the lists, or rejecting it and explaining the reasons for those rejections.

To many educators, the criteria that emerged from this process will not be surprising. The criteria reflect the experience and expertise of practitioners and leaders in developmental education, ESOL, and accessibility issues in education. The process included discussions of specific details about a variety of issues related to each emerging criterion. However, the criteria themselves are more general statements that encompass the various details brought forward in the discussions.

Inventory Development. Final criteria were drawn up using working group lists and advisory panel feedback. Another set of criteria lists was drawn from the literature

review (see Part II). The lists were compared and combined, and the combined lists (Figures A, B, and C) were used to develop an inventory of criteria for high-quality developmental education courses and ESOL courses, as well as criteria for effective use of assistive technologies.

The inventory underwent psychometric review and was field tested by advisory panelists and working group members. The final inventory (Appendix) was posted online, and an invitation to respond was distributed via email to 3,503 chief academic officers or other leaders at postsecondary institutions in Australia, Canada, Jamaica, New Zealand, Scotland, and the United States. Although six countries were represented in the distribution, most of the initial invitations went to U.S. institutions (94 percent). Ninety-six percent of respondents identified themselves as affiliated with U.S. institutions. The email invitations may have been forwarded, perhaps more than once, within a single institution, and since no request for institutional affiliation was indicated, the number of unduplicated institutions from which responses were received is not possible to determine. Based on the number of invitations initially distributed and the number of responses (466), the response rate was 13 percent. Sixty-three percent of respondents identified their position as "chief academic officer/instructional leader/dean."

Respondents were asked to indicate the credential(s) awarded by their institutions as well. Among the responses, 64 percent (297) indicated the certificate is awarded; 74 percent (345) indicated the associate degree; 38 percent (178) indicated the bachelor's degree; 30 percent (139) indicated the master's degree; and 11 percent (53) indicated the doctoral degree. Six percent (28) indicated "other." Respondents were asked to select all that applied.

Figure A. Combined Criteria: Developmental Education

Developmental Education

Working Groups, Advisors, Literature Review Combination

- Active learning
- Faculty involvement throughout the process
- Clear learning objectives
- Course content and supplemental materials link to learning objectives
- Written statements of program mission, goals, and objectives
- Learning communities
- Frequent contact between faculty and students
- Frequent contact among students
- Accommodating diverse learning talents and styles
- Frequent testing and feedback
- Support systems (*e.g.*, tutoring, advising, academic success courses) integrated into the overall strategy of developing, managing, and delivering developmental courses
- Mandatory assessment
- Mandatory placement
- Comprehensive, systemic evaluation of developmental courses and programs
- Developmental education is a centralized, well-coordinated, and well-managed program within the institution
- Faculty well trained in developmental education
- Student oriented
- Holistic
- Connected with college curriculum
- Incorporates critical skills
- Provides a safe learning environment that encourages risk-taking by setting high expectations and providing pathways to achieve them

Figure B. Combined Criteria: ESOL

ESOL

Working Groups, Advisors, Literature Review Combination

- Tailored instruction
- Individualized instruction
- Flexible instruction (in academic, life skills, and vocational training)
- Integrate language, content, and higher order thinking skills so language is not taught in isolation
- Multiple instructional approaches and techniques
- Learning communities
- Support services (*e.g.*, career and degree planning, financial aid advisement, residency information services)
- Partner with other organizations (*e.g.*, business corporations, community-based organizations, other educational institutions, government organizations)
- Purpose of assessment is clearly defined and identified
- Assessment instruments are specifically devised for non-native English speakers
- Multiple measures are used (*e.g.*, standardized assessments, performance assessments, portfolios)
- Assessment results are shared among the wider learning community, instructors, and staff as a basis for decision-making about program planning and instruction
- Consider the specific goals and needs of students
- Courses have explicit goals, learning outcomes, competencies, and/or objectives
- Placement in appropriate level of skill-based classes in reading, writing, speaking, and listening

Figure C. Combined Criteria: Assistive Technologies

ASSISTIVE TECHNOLOGIES
Working Groups, Advisors, Literature Review Combination

- Incorporate *The Principles of Universal Design:*
  - *The design is useful and marketable to people with diverse abilities.*
  - *The design accommodates a wide range of individual preferences and abilities.*
  - *Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.*
  - *The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.*
  - *The design minimizes hazards and the adverse consequences of accidental or unintended actions.*
  - *The design can be used efficiently and comfortably and with a minimum of fatigue.*
  - *Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.*

- Course design avoids inaccessible data and features and/or develops alternative methods to ensure accessibility
- Course design makes use of accessibility tools such as WebAIM, *Bobby*, or course management software features
- Course meets ADA and Section 508 guidelines
- Course complies with the Technology Related Assistance Act for Individuals with Disabilities Act of 1988
- Instructors or instructional designers are current and knowledgeable in assistive technologies and the integration of these technologies into course design

The Basic Education Online Inventory. The inventory sought from the field affirmation or rejection of identified criteria and provided opportunities for respondents to suggest additional criteria. It was divided into three sections: Developmental Education, ESOL, and Accessibility. Developmental education (reading, writing, and mathematics) was defined as "courses offered by a postsecondary institution and designed for students who otherwise qualify for admission to the institution, but whose academic achievement level does not meet the institution's minimum standards for full entry into its academic, vocational, or technical program(s)." Accessibility was explained thus: "One aspect of this open-content project is to ensure that courses are accessible to learners regardless of physical or

other ability. This section includes criteria for effective use of assistive technologies and other course design features that help ensure course accessibility."

In all three sections, respondents were asked to rate the criteria for high-quality courses in the relevant area by indicating the degree of importance of each criterion according to the following Likert scale:

1. Unimportant
2. Not very important
3. Important
4. Very important
5. Critically important

Respondents were instructed to react to each criterion independently, and were told that ranking the items was not necessary. Eighty-five percent of respondents indicated that developmental mathematics developmental writing, and/or developmental reading are offered at their institutions, and 49 percent indicated that ESOL is offered at their institutions.

INVENTORY RESULTS

With rare exception, respondents overwhelmingly agreed with the criteria listed on the inventory; for almost all criteria, at least 90 percent of responses were rated "important," "very important," or "critically important." This response provides affirmation that the criteria are appropriate for helping determine high-quality courses in the project's focus areas. These criteria are not meant to be seen as exclusive, however, nor did the inventory seek to establish them as the only criteria for making the high-quality determination. Indeed, respondents were provided an opportunity to report other criteria; summaries of these criteria are included in the results that follow.

DEVELOPMENTAL EDUCATION

Curriculum and Delivery. Ninety percent or more respondents rated the five Curriculum and Delivery criteria as "important," "very important" or "critically important," placing emphasis on the need for the integration of "explicitly stated intended learning outcomes" into the curriculum (98.5 percent), and for clearly defined strategies used to assess and evaluate student learning (98.5 percent) and to determine course effectiveness (99 percent). Eighty-nine percent of respondents rated "explicitly identified subject-matter content is used" as "very" or "critically" important, with another 9 percent rating this criterion as "important." Although only 69.5 percent of respondents rated "explicitly identified instructional delivery methods are used" as "very" or "critically" important, another 22 percent rated this as "important," bringing the level of ratings of at least "important" to 91.5 percent.

Figure D. Curriculum and Delivery.

In a high-quality developmental education course:	1	2	3	4	5
a. Explicitly identified instructional delivery methods are used.	2 (.5%)	28 (8%)	82 (22%)	124 (33.5%)	134 (36%)
b. Explicitly identified subject-matter content is used.	2 (.5%)	7 (2%)	33 (9%)	155 (42%)	173 (47%)
c. Explicitly stated intended learning outcomes are integrated into the curriculum.	0 (0%)	5 (1%)	13 (3.5%)	72 (19%)	281 (76%)
d. Clearly defined strategies are used to assess and evaluate student learning.	0 (0%)	5 (1%)	24 (6.5%)	96 (26%)	245 (66%)
e. Clearly defined strategies are used to determine course effectiveness.	1 (.5%)	3 (1%)	36 (10%)	133 (36%)	198 (53%)

Learner Support. Ninety-nine percent of respondents rated "Frequent interaction between students and instructor is an essential element" as "important," "very important," or "critically important," and 94.5 percent of respondents gave similar ratings to "Frequent interaction among students is an essential element." Ninety-six percent gave "important," "very important," and "critically important" ratings to "Academic support resources such as tutoring, advising, and mentoring are integrated into the course curriculum."

Figure E. Learner Support.

In a high-quality developmental education course:	1	2	3	4	5
f. Frequent interaction among students is an essential element.	2 (.5%)	16 (4%)	94 (25%)	135 (36.5%)	122 (33%)
g. Frequent interaction between students and instructor is an essential element.	3 (1%)	0 (0%)	11 (3%)	90 (24%)	265 (72%)
h. Academic support resources such as tutoring, advising, and mentoring are integrated into the course curriculum.	5 (1%)	8 (2%)	42 (11%)	124 (34%)	190 (51%)

Student Context. The strong need for assessment is evidenced by the 94 percent of respondents who rated as "very" or "critically" important the criterion that "Student knowledge is assessed for accurate placement at the course level." An additional 5 percent rated this item "important," bringing the total of the three "important" responses to 99 percent and further emphasizing that assessment is essential. Although 90 percent of respondents rated "Subject matter is presented in a context that is relevant and meaningful to students" as "very" or "critically" important, only 72 percent gave a similar rating to "Consideration for student experiences and perspectives is evident in the learning environment." However, an additional 24 percent gave the latter criterion an "important" rating. The accommodation of varied learning styles criterion received a "very" or "critically" important rating from 86 percent of respondents, with an additional 12 percent rating it as "important."

Figure F. Student Context.

In a high-quality developmental education course:	1	2	3	4	5
i. Student knowledge is assessed for accurate placement at the course level.	2 (.5%)	4 (1%)	18 (5%)	103 (28%)	243 (66%)
j. Consideration for student experiences and perspectives is evident in the learning environment.	0 (0%)	12 (3%)	90 (24%)	145 (39%)	123 (33%)
k. Accommodation is made for a variety of learning styles.	2 (.5%)	9 (2%)	43 (12%)	132 (36%)	183 (50%)
l. Subject matter is presented in a context that is relevant and meaningful to students.	1 (.5%)	7 (2%)	27 (7%)	109 (29%)	226 (61%)

Teaching and Learning Strategies. Ninety percent or more respondents rated as "very" or "critically" important the criteria that "learning opportunities and activities are provided to help students achieve clearly established, high expectations" (90 percent); "course content, including

learning materials and activities, is directly related to the achievement of course learning outcomes" (93 percent); and "active learning is a central principle to guide achievement of intended learning outcomes" (92 percent). Fewer respondents, 82 percent, gave the same rating to the criterion stating that "subject matter is presented in a way that highlights connections to other courses and/or subject areas," although an additional 15 percent rated this criterion as "important."

Figure G. Teaching and Learning Strategies.

In a high-quality developmental education course:	1	2	3	4	5
m. Learning opportunities and activities are provided to help students achieve clearly established, high expectations.	1 (.5%)	4 (1%)	31 (8%)	123 (33%)	212 (57%)
n. Course content, including learning materials and activities, is directly related to the achievement of course learning outcomes.	2 (.5%)	4 (1%)	21 (6%)	100 (27%)	243 (66%)
o. Active learning is a central principle to guide achievement of intended learning outcomes.	2 (.5%)	4 (1%)	23 (6%)	108 (29%)	233 (63%)
p. Subject matter is presented in a way that highlights connections to other courses and/or subject areas.	2 (.5%)	8 (2%)	57 (15%)	153 (41%)	150 (41%)

Instructor and Staff Qualifications. Most respondents indicated that instructors and learning support staff should be well qualified to serve developmental education students, with 98 percent rating instructor qualifications as "important," "very important," or "critically important," and 96 percent of respondents giving similar ratings to learning support staff qualifications.

Figure H. Instructor and Staff Qualifications.

In a high-quality developmental education course:	1	2	3	4	5
q. Instructors are qualified by education and experience in developmental education as well as in the content area as appropriate for developmental education.	4 (1%)	5 (1%)	40 (11%)	128 (35%)	193 (52%)
r. Learning support staff are qualified by education and experience in developmental education as well as in the content area as appropriate for their position and for developmental education.	3 (1%)	12 (3%)	70 (19%)	160 (43%)	125 (34%)

Other Criteria. Respondents were also asked to list any other criteria they would include for high-quality developmental education courses, and 179 criteria were submitted. The criteria were clustered, and most were found to be clarifications or specifications related to criteria on the inventory. Thirty-two responses, for example, listed specific qualifications for developmental faculty, sometimes relating to training in content or pedagogy and other times to more affective characteristics, *e.g.*: "Instructors who understand learning theories or how people learn as well as their content" and "Instructors should be chosen who are dedicated to the field of developmental education and who are committed to serving that student population."

Three new categories emerged from criteria that were not clustered with existing inventory categories: pace, feedback, and organizational issues. Eleven responses emphasized the need for students to learn at their own pace, from "flexible entry and exit" to "providing adequate time for students to assimilate learning" to "flexible instruction that responds to student needs as the course progresses." Some respondents elaborated: "Courses should include opportunities for students to master each outcome through a variety of strategies in a way that allows those students who master the outcome quickly to move on, and those who do not to engage in new and multiple learning strategies until they can master the outcome," and "Students may learn at different rates of speed, therefore a body of knowledge learned may take 10

weeks for some, a semester for others, and longer than a semester for the rest. But, all students are competent on the same body of knowledge."

Seven responses included criteria focusing on the need for providing prompt feedback to students, including comments such as "tools that allow immediate feedback for most goals/tasks help [students] be more realistic about their progress" and "frequent progress reports and one-on-one advising."

A third cluster, organizational issues, also emerged, with sixteen responses. Many of these criteria focused on institutional support for developmental education, emphasizing the need for these courses to be "integrated into the academic department and college" or to be "part of a coherent program with a structure that is not fragmented." Some of these criteria emphasized the importance of developmental education as an "institutional priority," as with the comment that "developmental instructors and classes must be seen as relevant and valuable to the institution as a whole…must be a full-fledged part of the total university." Other organizational criteria emphasized small class size and collaboration among faculty and staff. For example, "instructors of the same developmental course collaborate to select texts and other materials, develop lesson plans, and create instructional and assessment materials" and "instructors communicate with each other to monitor their students' progress in other developmental courses." Several of the organizational issues comments focused on the need to provide developmental education in "a context which does not demean the course or the students."

Implementation. Respondents were also asked to identify the three criteria that they considered the most difficult to implement, and 627 responses were submitted. Fifty-seven of these responses indicated "Academic support resources such as tutoring, advising, and mentoring are integrated into the course curriculum" as among the most difficult to implement, with 53 responses indicating "Accommodation is made for a variety of learning styles" as among the most difficult to implement. "Clearly defined strategies are used to assess and evaluate student learning" was listed 48 times, and "Subject matter is presented in a context that is relevant and

meaningful to students" was listed 46 times. Figure I lists the inventory criteria and the frequency of response. Respondents frequently combined items f and g and items q and r, so they are tallied together. Figure I does not include other criteria, which together represented 43 responses.

Figure I. Difficulty of Implementation: Developmental Education.

Criteria	Frequency
a. Explicitly identified instructional delivery methods are used.	15
b. Explicitly identified subject-matter content is used.	9
c. Explicitly stated intended learning outcomes are integrated into the curriculum.	37
d. Clearly defined strategies are used to assess and evaluate student learning.	48
e. Clearly defined strategies are used to determine course effectiveness.	41
f. Frequent interaction among students is an essential element. AND/OR g. Frequent interaction between students and instructor is an essential element.	47
h. Academic support resources such as tutoring, advising, and mentoring are integrated into the course curriculum.	57
i. Student knowledge is assessed for accurate placement at the course level.	27
j. Consideration for student experiences and perspectives is evident in the learning environment.	24
k. Accommodation is made for a variety of learning styles.	53
l. Subject matter is presented in a context that is relevant and meaningful to students.	46
m. Learning opportunities and activities are provided to help students achieve clearly established, high expectations.	18
n. Course content, including learning materials and activities, is directly related to the achievement of course learning outcomes.	7
o. Active learning is a central principle to guide achievement of intended learning outcomes.	29
p. Subject matter is presented in a way that highlights connections to other courses and/or subject areas.	38
q. Instructors are qualified by education and experience in developmental education as well as in the content area as appropriate for developmental education. AND/OR r. Learning support staff are qualified by education and experience in developmental education as well as in the content area as appropriate for their position and for developmental education.	88

ENGLISH FOR SPEAKERS OF OTHER LANGUAGES

Teaching and Learning Strategies. A large percentage of respondents – 88 percent – rated the criterion that "accommodation is made for a variety of individual learning styles" as "very" or "critically" important, and 86 percent indicated that "academic support resources such as tutoring, advising, and mentoring are integrated into the course curriculum" is a "very" or "critically" important criterion. A slightly greater percentage (91 percent) of respondents rated as "very" or "critically" important the criterion that "instructional strategies accommodate individual student characteristics such as needs, interests, backgrounds, and language abilities," with 8 percent rating this criterion as "important." The criterion stating that "learning is extended outside the classroom through partnerships with other organizations such as businesses, community-based organizations, other educational institutions, and government organizations" received the lowest percentage of "very" and "critically" important ratings, at 57 percent; 31 percent rated this criterion "important."

Figure J. Teaching and Learning Strategies.

In a high-quality ESOL/ESL course:	1	2	3	4	5
a. Instructional strategies accommodate individual student characteristics such as needs, interests, backgrounds, and language abilities.	0 (0%)	2 (1%)	17 (8%)	72 (34%)	119 (57%)
b. Accommodation is made for a variety of individual learning styles.	0 (0%)	4 (2%)	21 (10%)	89 (43%)	95 (45%)
c. Academic support resources such as tutoring, advising, and mentoring are integrated into the course curriculum.	1 (.5%)	3 (1%)	27 (13%)	68 (33%)	110 (53%)
d. Learning is extended outside the classroom through partnerships with other organizations such as businesses, community-based organizations, other educational institutions, and government organizations.	4 (2%)	22 (11%)	65 (31%)	70 (34%)	47 (23%)

Course Outcomes. The importance of identifying clear, explicit intended learning outcomes at the course level is indicated by the 95 percent response to this criterion as "very" or "critically" important. The criterion that "the purpose of the course is clearly, specifically defined" received "very" or "critically" important ratings from 88 percent of respondents.

Figure K. Course Outcomes.

In a high-quality ESOL/ESL course:	1	2	3	4	5
e. Clear, explicit intended learning outcomes are identified at the course level.	0 (0%)	2 (1%)	10 (5%)	51 (25%)	144 (70%)
f. The purpose of the course is clearly, specifically defined (e.g., academic course; life-skills course; vocational training course).	0 (0%)	3 (1%)	21 (10%)	63 (30%)	120 (58%)

Assessment. At least 90 percent of respondents indicated "very" or "critically" important for all items in the assessment category, and 96 to 97 percent for three of those items. Assessment of reading, writing, speaking, and listening skills for placement (96 percent) and for achievement of intended student learning outcomes (97 percent) both ranked high at the "very" or "critically" important level. Ninety-seven percent of respondents indicated "very" or "critically" important for the criteria stating that "methods and tools of assessment are appropriate for non-native English speakers," and 92 percent agreed that using multiple means of assessment "to determine student achievement of intended learning outcomes" was "very" or "critically" important. The use of assessment results to improve quality and effectiveness of a course was deemed "very" or "critically" important by 90 percent of respondents, with 9 percent rating this criterion as "important."

Figure L. Assessment.

In a high-quality ESOL/ESL course:	1	2	3	4	5
g. Student skills such as reading, writing, speaking, and listening are assessed for effective ESOL/ESL course placement.	1 (.5%)	0 (0%)	6 (3%)	46 (22%)	154 (74%)
h. Methods and tools of assessment are appropriate for non-native English speakers.	0 (0%)	1 (.5%)	5 (2%)	48 (23%)	152 (74%)
i. Student skills such as reading, writing, speaking, and listening are assessed for achievement of intended student learning outcomes.	0 (0%)	1 (.5%)	6 (3%)	53 (26%)	146 (71%)
j. Multiple means of assessment are used to determine student achievement of intended learning outcomes.	0 (0%)	1 (.5%)	15 (7%)	84 (41%)	106 (51%)
k. Aggregate student assessment results are used as a basis for improving quality and effectiveness.	0 (0%)	3 (1%)	18 (9%)	88 (43%)	95 (47%)

Other Criteria. Respondents were requested to submit criteria they would add to the list and 75 criteria were submitted. As with the developmental education responses, many of the criteria were related to existing inventory criteria and categories. Added criteria emphasized, for example, the need for academic support resources to be integrated into the course curriculum. One respondent suggested, "Active support services that do not wait for students to cry 'Help,'" while others submitted criteria dealing with specific academic support services such as materials, audio labs and other "technology-based curriculum tools," multilingual assistants, and English-speaking peer mentors.

Respondents also submitted criteria in support of the inventory item stating that "Instructional strategies accommodate individual student characteristics such as needs, interests, backgrounds, and language abilities." For example, one respondent recommended "balance in skill areas" to meet the needs of students who have specific gaps in their skill levels. The respondent explained: "Many

students will be extraordinarily proficient in writing and reading but woefully lacking in speaking and listening. Others will excel in the areas of speaking and listening but lag in the areas of writing and reading. Achieving balance should be the goal of courses which have a goal of producing a student who will be prepared for higher education."

Of the criteria that did not cluster into existing inventory categories, 15 dealt with faculty and staff qualifications, with several responses specifying that ESOL instructors and academic support staff be appropriately qualified in ESOL. One response included both cognitive and affective qualifications: "It is vitally important in an ESL class that the teacher be highly qualified and motivated.... It is also critical that the teacher be able to empathize with the students, as they have an immediate need to learn the language for survival."

Three responses focused on pace, noting the need for flexible instruction that allows students to "proceed at a rate which provides for their needs" or to "move through curriculum more rapidly or take additional time to build skills." Several respondents noted that they had little or no knowledge of ESOL instruction but were responding to the inventory as developmental education professionals.

Implementation. Respondents were also asked to identify the three criteria that they considered the most difficult to implement, and 356 responses were submitted. Fifty-three of the responses indicated "Learning is extended outside the classroom through partnerships with other organizations such as businesses, community-based organizations, other educational institutions, and government organizations." Forty-seven responses indicated "Instructional strategies accommodate individual student characteristics such as needs, interests, backgrounds, and language abilities." Two criteria were listed 41 times each: "Accommodation is made for a variety of individual learning styles" and "Academic support resources such as tutoring, advising, and mentoring are integrated into the course curriculum."

Figure M. Difficulty of Implementation: ESOL.

Criteria	Frequency
a. Instructional strategies accommodate individual student characteristics such as needs, interests, backgrounds, and language abilities.	47
b. Accommodation is made for a variety of individual learning styles.	41
c. Academic support resources such as tutoring, advising, and mentoring are integrated into the course curriculum.	41
d. Learning is extended outside the classroom through partnerships with other organizations such as businesses, community-based organizations, other educational institutions, and government organizations.	53
e. Clear, explicit intended learning outcomes are identified at the course level.	13
f. The purpose of the course is clearly, specifically defined (e.g. academic course; life-skills course; vocational training course).	7
g. Student skills such as reading, writing, speaking, and listening are assessed for effective ESOL/ESL course placement.	23
h. Methods and tools of assessment are appropriate for non-native English speakers.	23
i. Student skills such as reading, writing, speaking, and listening are assessed for achievement of intended student learning outcomes.	17
j. Multiple means of assessment are used to determine student achievement of intended learning outcomes.	25
k. Aggregate student assessment results are used as a basis for improving quality and effectiveness.	29

Figure M does not include other criteria, which together represented 37 responses.

ACCESSIBILITY

Respondents affirmed the accessibility criteria, with all five criteria overwhelmingly rated as "important," "very important," or "critically important." Effectively communicating all course information to all students received the highest rating with 96 percent of respondents indicating "very" or "critically" important, and another 3 percent indicating "important." Eighty percent of respondents indicated "very" or "critically" important for the criterion that "users participate in the course efficiently and comfortably with a minimum of fatigue," with 18 percent indicating "important." Meeting or exceeding local, regional, and/or national accessibility requirements was considered "very" or "critically" important by 84 percent of respondents, while 13 percent indicated it as "important." Qualifications for faculty, instructional designers, and academic support staff rated high as well, with 86 percent indicating it "very" or "critically" important that these groups be "current and knowledgeable in the use of assistive technologies" (11 percent indicated "important"), and 83 percent indicating it "very" or "critically" important that teaching staff and instructional designers be "current and knowledgeable in the integration of assistive technologies and accessibility standards into course design" (14 percent indicated "important").

Figure N. Accessibility.

In a course that is effectively accessible:	1	2	3	4	5
a. All course information is communicated effectively to all students.	2 (.5%)	2 (.5%)	13 (3%)	93 (22%)	312 (74%)
b. Users participate in the course efficiently and comfortably with a minimum of fatigue.	3 (1%)	10 (2%)	74 (18%)	192 (46%)	143 (34%)
c. Local, regional, and/or national accessibility requirements are met or exceeded.	3 (1%)	6 (1%)	55 (13%)	156 (37%)	197 (47%)
d. Teaching staff, instructional designers, and academic support staff are current and knowledgeable in the use of assistive technologies.	1 (.5%)	9 (2%)	47 (11%)	170 (40%)	193 (46%)
e. Teaching staff and instructional designers are current and knowledgeable in the integration of assistive technologies and accessibility standards into course design.	3 (1%)	9 (2%)	58 (14%)	168 (40%)	182 (43%)

Other Criteria. Respondents were invited to submit additional criteria, and 70 responses were received. Many of these were specific to criteria that were included in the inventory, particularly criteria regarding staff knowledge and "integration of assistive technologies and accessibility standards into course design." Other responses focused on issues and concerns that generally dealt with ensuring student access and success. One response, for example, noted the importance of individualization, explaining that the "huge differences in students with a specific diagnosis" should be considered. Others focused on the need not only for student access to necessary technology but also the ability to use that technology as needed for full participation in the course. For example, one response emphasized the need for the "concept of universal design [to be] predominant in all instruction."

THE FUTURE OF BASIC EDUCATION ONLINE

The field's strong affirmation of the criteria for high-quality courses in developmental education and ESOL solidified the inventory criteria as the basis for development of the request for qualifications (RFQ) to be used in selecting courses for the proposed open-content project. The RFQ was developed and reviewed by the advisory panelists and working group participants. The RFQ was then issued to postsecondary institutions in six countries, inviting statements of qualification for high-quality courses in developmental reading, developmental writing, developmental mathematics, and ESOL.

Statements of qualification were reviewed by practitioners and scholars, and representatives from colleges submitting selected courses were invited to participate in designing the proposed open-content project. Their input, along with the findings from the literature review and inventory, will be used to develop a proposal for a large-scale project to develop high-quality online developmental reading, developmental writing, developmental mathematics, and ESOL courses for the open-content environment. The proposed project will help meet a need for access to high-quality developmental education and ESOL courses.

Challenges. The work ahead faces several challenges that were identified through this project. In some ways, the findings argue against an independent-learning option for developmental education students. For example, the identified criteria and the inventory responses indicate a strong need for teacher-student interaction and student-student interaction. These findings suggest that, to serve independent learners in developmental education courses adequately, the open-content courses will need to include interactive elements that facilitate a strong connection between the learner and the content, or that strategies be implemented to help the learner connect to other independent learners or to interested mentors. Finding ways to replicate, even partially, the teacher-student and student-student interaction that occurs in a communal learning environment may be challenging, but promising work is exploring ways to do just that. The Hewlett Foundation is funding research in the area of online learning

communities as open educational resources, and this may help foster the kinds of interaction practitioners and researchers agree is a significant factor in the success of developmental education students. Utah State University's Open Learning Support Project, for example, is building software to facilitate user-constructed learning communities as places independent learners can go to ask questions, discuss content, and interact with other independent learners (USU, 2004).

A related challenge is the strong need for learner support for developmental education and ESOL students. With no faculty or staff to provide such services, the proposed open-content courses will need to integrate academic and other support into the independent-study option. The inventory indicates strong affirmation of the need for and emphasis on adequate and relevant assessment and outcomes information. Academic support, including appropriate assessment, evaluation, and feedback, will need to be incorporated into the design of the open-content courses that are developed in the proposed project.

Making the open-content courses accessible is another challenge. While models and resources are available for making online courses accessible to all users, the availability of hardware and connectivity necessary for the individual learner to have access is problematic in many parts of the world. This limitation will not be overcome by the proposed project; however, other projects are seeking ways to ensure universal access to technology for education. Since 2000, for example, the Partnership for Higher Education in Africa has funded efforts to "build core capacity and support special initiatives" at universities in several African nations, and recently announced a $200 million commitment to continue this work (Hewlett, 2005).

Benefits. The open-content environment makes high-quality online courses freely available to instructors, independent learners, institutions, and others – quality courses that otherwise may not be available to those who most need them. As open educational resources, high-quality courses in developmental education and ESOL will provide models for instructors who seek them. These models will assist new and

veteran instructors alike, offering options for incorporating innovative instructional design and technology into their own courses, adapting the open-content courses for their own use, or using the open-content courses as they are. Ensuring that each course's curriculum is internationalized will help make the courses meaningful to users from all parts of the world, as will including easy processes for selecting, adding, or adapting content for local relevance.

Open-content developmental education and ESOL courses also support the goal of universal basic and secondary education. In areas where access to high-quality resources is limited, these courses will serve not only as models for instructors, but also as free options for self-directed learners who seek to improve basic skills or English language acquisition. The proposed project will explore ways to provide support for the independent learner by incorporating academic elements such as tutorials, supplemental instruction, and assessment into the open-content courses. Learners will be able to work through an entire course or select modules or lessons that meet their particular needs.

Some respondents to the inventory expressed concern about the appropriateness of independent study in the online environment, particularly for developmental education students. One response, though, suggested that, "it may not be the type of media but how we use it." The project will seek ways the powerful medium of the internet can be used to facilitate universal basic education through open-content courses that are freely available to anyone who wants to use them. With aspects such as thoughtful instructional design and connections with OER projects that offer learning communities and other academic support elements, the courses will strive to include features that research and practice have shown facilitate learner success.

Developing useful open-content courses in developmental education and ESOL may in some ways be challenging, but the proposed project starts with a research-based, field-affirmed list of criteria for helping to ensure that the selected courses are, and the OER courses will be, of high quality. The challenges associated with this work may make the road ahead difficult.

Indeed, in some places that road may not have been built yet. It is a road worth taking and worth building, though, since it leads to the availability of high-quality courses for free use by educators and learners around the globe. More important, this work can help provide access to and opportunities for education that do not exist for many people in the world today.

To learn more about the Open Educational Resources movement and to find links to OER projects, visit the Hewlett Foundation website at http://www.hewlett.org/Programs/Education/Technology/OpenContent/opencontent.htm.

Information about the Basic Education Online Project is available on the League for Innovation in the Community College website at http://www.league.org/league/projects/beo/index.html.

APPENDIX
BASIC EDUCATION ONLINE PROJECT INVENTORY

Basic Education Online Project Inventory
Criteria for High-Quality Courses in
Developmental Education and English for Speakers of Other Languages

Section 1. Developmental Education. Developmental education refers to courses offered by a postsecondary institution and designed for students who otherwise qualify for admission to the institution, but whose academic achievement level does not meet the institution's minimum standards for full entry into its academic, vocational, or technical program(s).

1.	Are developmental mathematics, developmental writing, and/or developmental reading offered at your institution?	
		Yes (Please continue with Item 2.)
		No (Please proceed to Section 2, item 9.)

Please respond to the criteria for high-quality developmental education courses (reading, writing, and mathematics) by indicating the degree of importance of each criterion according to the following scale. Please react to each criterion independently. Ranking the items is not necessary. For example, in item 2 you may have the same response for more than one of the five criteria.

1. Unimportant
2. Not very important
3. Important
4. Very important
5. Critically important

2.	Curriculum and Delivery. In a high-quality developmental education course,					
		1	2	3	4	5
a.	Explicitly identified instructional delivery methods are used.					
b.	Explicitly identified subject-matter content is used.					
c.	Explicitly stated intended learning outcomes are integrated into the curriculum.					
d.	Clearly defined strategies are used to assess and evaluate student learning.					
e.	Clearly defined strategies are used to determine course effectiveness.					

3.	Learner Support. In a high-quality developmental education course,					
		1	2	3	4	5
f.	Frequent interaction among students is an essential element.					
g.	Frequent interaction between students and instructor is an essential element.					
h.	Academic support resources such as tutoring, advising, and mentoring are integrated into the course curriculum.					

4.	Student Context. In a high-quality developmental education course,					
		1	2	3	4	5
i.	Student knowledge is assessed for accurate placement at the course level.					
j.	Consideration for student experiences and perspectives is evident in the learning environment.					
k.	Accommodation is made for a variety of learning styles.					
l.	Subject matter is presented in a context that is relevant and meaningful to students.					

5.	Teaching and Learning Strategies. In a high-quality developmental course,					
		1	2	3	4	5
m.	Learning opportunities and activities are provided to help students achieve clearly established, high expectations.					
n.	Course content, including learning materials and activities, is directly related to the achievement of course learning outcomes.					
o.	Active learning is a central principle to guide achievement of intended learning outcomes.					
p.	Subject matter is presented in a way that highlights connections to other courses and/or subject areas.					

6.	Instructor and Staff Qualifications. In a high-quality developmental education course,					
		1	2	3	4	5
q.	Instructors are qualified by education and experience in developmental education as well as in the content area as appropriate for developmental education.					
r.	Learning support staff are qualified by education and experience in developmental education as well as in the content area as appropriate for their position and for developmental education.					

7.	In this space, please list any other criteria you would include for high-quality developmental education courses.
8.	Please list the three criteria in Section 1 that, in your opinion, are the most difficult to implement. The criteria include those listed as well as those you may have added.

9.	Are ESOL/ESL courses offered at your institution?	
		Yes (Please continue with item 10.)
		No (Please proceed to Section 3, item 15.)

Section 2. English for Speakers of Other Languages (ESOL/ESL).

Please respond to the criteria for high-quality English for Speakers of Other Languages (ESOL/ESL) courses by indicating the degree of importance of each criterion according to the following scale. Please react to each criterion independently. Ranking the items is not necessary. For example, in item 10 you may have the same response for more than one of the four criteria.

1. Unimportant
2. Not very important
3. Important
4. Very important
5. Critically important

10.	Teaching and Learning Strategies. In a high-quality ESOL/ESL course:					
		1	2	3	4	5
a.	Instructional strategies accommodate individual student characteristics such as needs, interests, backgrounds, and language abilities.					
b.	Accommodation is made for a variety of individual learning styles.					
c.	Academic support resources such as tutoring, advising, and mentoring are integrated into the course curriculum.					
d.	Learning is extended outside the classroom through partnerships with other organizations such as businesses, community-based organizations, other educational institutions, and government organizations.					

11.	In a high-quality ESOL/ESL course:					
		1	2	3	4	5
e.	Clear, explicit intended learning outcomes are identified at the course level.					
f.	The purpose of the course is clearly, specifically defined (e.g., academic course; life-skills course; vocational training course).					

12.	Assessment. In a high-quality ESOL/ESL course:					
		1	2	3	4	5
g.	Student skills such as reading, writing, speaking, and listening are assessed for effective ESOL/ESL course placement.					
h.	Methods and tools of assessment are appropriate for non-native English speakers.					
i.	Student skills such as reading, writing, speaking, and listening are assessed for achievement of intended student learning outcomes.					
j.	Multiple means of assessment are used to determine student achievement of intended learning outcomes.					
k.	Aggregate student assessment results are used as a basis for improving quality and effectiveness.					

13.	In this space, please list any other criteria you would include for high-quality ESOL/ESL courses.
14.	Please list the three criteria in Section 2 that, in your opinion, are the most difficult to implement. The criteria include those listed as well as those you may have added.

Section 3. Accessibility. One aspect of this open-content project is to ensure that courses are accessible to learners regardless of physical or other ability. This section includes criteria for effective use of assistive technologies and other course design features that help ensure course accessibility.

Please respond to the criteria for effectively accessible courses by indicating the degree of importance of each criterion according to the following scale. Please react to each criterion independently. Ranking the

items is not necessary. For example, you may have the same response for more than one of the five criteria.

1. Unimportant
2. Not very important
3. Important
4. Very important
5. Critically important

15.	In a course that is effectively accessible:					
		1	2	3	4	5
a.	All course information is communicated effectively to all students.					
b.	Users participate in the course efficiently and comfortably with a minimum of fatigue.					
c.	Local, regional, and/or national accessibility requirements are met or exceeded.					
d.	Teaching staff, instructional designers, and academic support staff are current and knowledgeable in the use of assistive technologies.					
e.	Teaching staff and instructional designers are current and knowledgeable in the integration of assistive technologies and accessibility standards into course design.					

16.	In this space, please list any other criteria you would include for effective accessibility.

Section 4. Respondent Information.

17.	Please indicate your job position:
	❑ president/principal/chief executive officer ❑ chief academic officer/instructional leader/dean ❑ other (please specify) _____

18.	Please indicate the credential(s) awarded by your institution. Select all that apply.
	❑ certificate ❑ associate's degree/advanced diploma ❑ bachelor's degree ❑ master's degree ❑ doctoral degree ❑ other (please specify) _____

19.	Please indicate your institution's home country:
	❑ Australia ❑ Canada ❑ Jamaica ❑ New Zealand ❑ Scotland ❑ United States ❑ other (please specify) _____

20.	If your college may be interested in participating in the larger-scale project to provide open-content courses in developmental reading, developmental writing, developmental mathematics, and ESOL, please provide the following information:
	Institution: Contact person: Address Line 1: Address Line 2: City: State or Province: Postal Code: Country: Email Address: Phone Number:

21.	Please use this space for any additional comments.

Note: The inventory was originally produced as an online document. This print version is a facsimile of the online version.

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PART II

Literature Review

Institute for the Study of
Knowledge Management in Education

Lisa Petrides, Anastasia Karaglani, Lilly Nguyen

The purpose of this literature review is to provide context that can be used to frame the discussion of characteristics of highly effective basic online education. This includes criteria for effective developmental education courses and for English as a Second Language, as well as what is considered to be the state of the art in effective assistive technologies, and how these technologies might be implemented specifically around developmental education courses for online learning. In each of the three sections, we examine literature that helps to define what is meant by high quality and then provide basic demographics of the population that these courses serve, as well as literature that presents examples and models of existing implementations of developmental education, English as a Second Language, and assistive technologies.

SECTION I: DEVELOPMENTAL EDUCATION

This section presents definitions and statistics on developmental education and distance education; discusses criteria for determining high-quality developmental courses; examines some cases of high-quality online, onsite, and hybrid developmental courses; reviews examples of programs offering distance learning classes in community colleges; and addresses challenges of developmental education.

The Context of Developmental and Online Education

According to the National Association for Developmental Education (NADE, 2001), "Developmental education is a field of practice and research within higher education with a theoretical foundation in developmental psychology and learning theory." As such, its purpose is to promote cognitive and affective growth for all postsecondary learners at all levels of learning. At its core, developmental education is not only remediation for learning that did not take place in high school, but also a way to be responsive to individual differences and special needs of those pursuing postsecondary learning.

According to NADE, developmental education programs and services address issues of academic preparedness, diagnostic assessment and placement, general and discipline-specific

learning strategies, and affective barriers to learning. This includes learning assistance, such as tutoring, mentoring, and supplemental instruction; personal and career counseling; and academic advisement and coursework (NADE, 2001).

Boylan (2002), in his book titled *What Works: Research-Based Practices in Developmental Education*, defines developmental education as "courses or services provided for the purpose of helping underprepared college students attain their academic goals" (p. 3).

According to a 1996 report issued by the National Center for Education Statistics (NCES, 1996), 41 percent of students entering public and private community colleges in fall 1995 were enrolled in one or more developmental courses. This number is up from 36 percent in 1991. In public community colleges, one in five students required remedial reading, one in four required remedial writing, and one in three required remedial math. This has renewed the concern about the importance of math remediation and its impact on math and science career trajectories, as well as the importance of acquiring basic skills in English reading and writing.

According to the American Council on Education (Knopp, 1996), 13 percent of all undergraduates, about 1.6 million students, reported having taken one or more developmental courses in college. It is estimated that another million students obtain remediation through tutoring programs or learning centers (Boylan, 1999). This suggests that, of the nation's more than 12 million undergraduates, about 2 million participate in developmental education during any given year.

In fall 2000, 28 percent of entering freshmen enrolled in one or more developmental reading, writing, or mathematics courses. The proportion of freshmen enrolled in developmental mathematics was larger than those enrolled in writing (*i.e.*, 22 versus 14 percent). The time students spent in remediation was generally limited to one year or less. In two-year public institutions, 42 percent of entering freshmen enrolled in developmental courses.

As defined by Michael Moore, former director of The American Center for the Study of Distance Education at Pennsylvania State University, "Distance education is planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of communication by electronic and other technology, as well as special organizational and administrative arrangements" (Moore & Kearsley, 1996).

In the academic year 2000-2001, 56 percent of all two- and four-year degree-granting institutions offered distance education courses. Broken down by sector, 90 percent of public two-year institutions offered distance education courses, compared with 89 percent of public four-year institutions and 16 percent of private two-year institutions. Total enrollment in distance education courses for two- and four-year institutions combined was 3,077,000 students. Public two-year institutions had the greatest number of enrollments in distance education courses, with 1,472,000, or 48 percent of total enrollment.

Among institutions that offer distance education courses, 90 percent offered internet courses using asynchronous computer-based instruction. Forty-three percent offered synchronous computer-based instruction. Eighty-eight percent of institutions that currently offer distance education courses indicated that they plan to increase the number of internet courses using asynchronous computer-based instruction as a primary mode of instructional delivery for distance education courses (NCES, July 2003).

In California community colleges, between 1995 and 2000, enrollment in distance education courses for credit almost tripled, from 54,524 to 152,690 students. The enrollment of distance education students among all students rose from 2.5 to 5.5 percent. Distance education completion rates have increased significantly in the past four years. This increase has narrowed the gap between student success in distance education and nondistance education. The completion rate for credit distance education was approximately 57 percent in the academic year 2001-2002, versus 64 percent for credit

nondistance education courses in the same year (Academic Affairs and Instructional Resources Unit, 2003).

In fall 2000, 13 percent of all institutions offered developmental courses through distance education. Broken down by sector, 25 percent of two-year educational institutions offered distance developmental courses, compared to 8 percent of public four-year, 4 percent of private four-year, and less than 1 percent of private two-year institutions. Between 1995 and 2000, there was an increase (from 3 to13 percent) in the proportion of institutions overall that offered developmental courses through distance education (NCES, November 2003). Sixty-four percent of distance developmental education was delivered via asynchronous computer-based instruction. Twenty-five percent of distance developmental education was delivered via synchronous computer-based instruction, such as two-way interactive video, one-way prerecorded video, and so forth (NCES, November 2003).

Criteria for Determining High-Quality Online Developmental Courses

A wide variety of practices is cited in the literature on the subjects of developmental education and distance education. Practices presented in this section have been identified as successful by experts in the field of online learning and developmental education. (Appendix A includes the sources used to determine effective practices in developmental education, and Appendix B presents the sources used to determine effective practices in online learning.)

This section is organized into three parts that cover a group of related effective practices: course content, course pedagogy, and program structure.

Course Content. Criteria for effective methods for offering course content include the use of active learning techniques and the establishment of clear learning objectives. Active learning methods are characterized by the fact that they are designed to elicit students' active participation in the learning process. Examples include students engaged in (1) problem-solving groups, (2) delivering presentations, (3) interactive

exchanges via email or other online collaboration tools, (4) engaging in simulation games involving real-life experiences, and (5) using the internet to find resources. McKeachie (2002) suggests that active learning is the most effective technique available to college instructors. Grubb (1999) indicates that active learning techniques are most appropriate for developmental students, since they promote higher order thinking and learning skills.

In both developmental education and online course development, experts emphasize the need to have faculty involvement throughout the process, in which faculty establish clear objectives and ensure that course content and supplemental materials link to these objectives appropriately. The National Study of Developmental Education (Boylan, Bonham, Claxton, & Bliss, 1992) found that developmental programs with clearly identified, written statements of mission and goals had a greater number of students who completed and passed the developmental courses than programs without such stated mission and goals.

Pedagogy and Engagement. Criteria for effective methods of course pedagogy include accommodating diverse talents and learning styles, providing frequent testing and feedback, helping to establish learning communities, and facilitating collaboration between students and faculty and among peer groups of students.

Boylan (2002) suggests that varied teaching methods are important because developmental students are diverse in age and ethnicity, in social and economic backgrounds, and in reasons for being underprepared for college-level work. Methods most often used in best-practice institutions include self-paced instruction, individualized instruction, peer review of student work, collaborative learning, computer-based instruction, mastery learning, and small-group work. Additionally, Boylan recommends providing feedback from frequent testing, as it "allows developmental students to monitor their own performance based on some standards and adjust their study and practice activities accordingly" (p. 79). An appropriate testing opportunity requires that (1) study or preparation be an important element of that opportunity; (2) topics covered be relevant to a particular

concept or unit; (3) the product be graded against some standard; and (4) feedback be provided to students on their performance (Boylan, 2002, p. 79).

In terms of pedagogy, the approach at Richland College is to offer many different options for student learning, such as computer-based instruction, small-group discussion sections, experiential learning, paired courses, weekend courses, and eight-week fast-track courses (Boylan, 2002).

In another example, Riverside Community College students are expected to use an online assessment program as part of their math instruction. This web-based program is used to promote verbal, visual, and discovery-based learning. Through using these individualized assessments and study plans, customized learning programs are created for each student. But most important, through this computerized system, students can tailor their instruction to their needs and learning styles. They start by assessing themselves to determine their previous knowledge, and can then decide how much time they will spend on a certain topic and on which topics they need to focus.

As a result of using these programs, (1) instructors can easily monitor students' work and their progress; (2) class meetings and lectures focus only on topics that students find difficult; (3) interaction time between students and faculty has increased; (4) lecture time and time spent on homework review has been reduced; (5) faculty time spent on preparing tests and test grading was eliminated; and (6) students receive immediate feedback after their assessment (Twigg, 2001).

University of Illinois at Urbana-Champaign's Mallard[1] and Michigan State's Computer-Assisted Personalized Approach (CAPA[2]) are two examples of software tools that offer customized learning experiences based on assessment results. These programs assess individual students' strengths and weaknesses to customize learning materials tailored to meet assessed gaps in abilities. Carnegie Mellon University has developed an "intelligent

1 More information about Mallard can be found at http://www.ews.uiuc.edu/Mallard/Overview/.
2 More information about CAPA can be found at http://capa4.lite.msu.edu/homepage/.

tutor" that can follow a student's progress and can adapt the learning environment to respond to areas of difficulty a student may have (Twigg, 2001).

Learning communities have been used to link courses and groups of students, so that students encounter learning as a shared rather than isolated experience (Boylan, 2002). Because learning communities group students together, they can be used to reinforce the benefits of peer-to-peer learning. For example, instructors of a group or cohort function as a team to ensure that the content of one course is related to content in other courses and to help students make connections to that content. Typically, students in a learning community spend a large amount of time working together in small groups and teams to study, solve problems, and complete assignments and projects (Boylan, 2002). Research at Sandhills Community College found that the use of learning communities resulted in a dramatic increase in students' persistence in developmental English and reading courses (Boylan, 2002). Seattle Central Community College's Coordinated Studies "utilizes a form of learning-community pedagogy designed to let students discover the connection and interrelatedness of disciplines and knowledge" (McCabe, 2003, p. 211).

Finally, frequent contact between faculty and students has been used to enhance their intellectual commitment and ownership, which in turn leads to greater retention (Chickering & Ehrmann, 1996). Asynchronous online learning can encourage student-to-faculty communication, as it allows for diverse opinions without the potentially intimidating demands of face-to-face communications (Kubala, 1998). Student-to-student communication also is important, because the connections made between students help sustain interest and motivation (Twigg, 2001).

One of the participating institutions in Twigg's Course Redesign Project, Washington State University, posts syllabi that give complete information about the topics to be studied, the resources to be used, and tips for being successful in the course. Students can view this information before enrolling in a course, which might also include a video introduction

from the professor that describes the specific course and illustrates why the subject would be interesting to a prospective student (Twigg, 2001).

Creating Support Systems: Services, Placement, and Evaluation. Literature suggests that developmental education students require a range of support systems in order to be successful. This includes services such as tutoring, advising, orientation, and academic success courses. These support systems work best when integrated into the overall strategy of developing, managing, and delivering developmental courses. Community College of Denver uses case-management teams, and Valencia Community College in Florida uses individualized learning plans called LifeMaps. Sinclair Community College in Ohio created cybertutorials to address learning needs of students in gateway courses (McCabe, 2003). Tutoring often requires specific structures to be put in place, for example, according to Casazza and Silverman (1996), successful tutor training programs include preservice and in-service tutor training. This is of particular importance in community colleges. For example, Boylan, et al. (1992) reported that community colleges use full-time professional tutors about twice as frequently as universities.

Placing students appropriately as a result of assessments is fundamental to student success. Mandatory assessment is the critical initial step in developmental education, which needs to be supported by mandatory placement as well (Boylan, 2002). Some institutions are experimenting with groundbreaking assessment techniques to develop a more complete picture of students' needs. Florida Gulf Coast University (FGCU) has been cited as a best-practice example (Twigg, 2001). FGCU offers an introductory general education course called Styles and Ways of Learning, in which students complete the Myers-Briggs Type Indicator (MBTI) instrument that identifies their preferences of mental processes and habits. The MBTI helps students become aware of the various ways in which they might be more successful learners, such as through collaborative experiences or hands-on processes. In its redesign of its introductory art appreciation course, Understanding the Visual and Performing Arts, FGCU will create learning activities that build on the different learning

styles of students so that they can be directed to learning activities that are most suited to their preferred learning styles (Twigg, 2001).

Boylan (2002) describes systematic evaluation as "evaluation that is done at regular intervals; evaluation activities that are undertaken as part of a systematic plan; evaluation activities that are both formative and summative; evaluation activities that use a variety of measures; and evaluation information that is shared with a variety of audiences" (pp. 39-40). Furthermore, Boylan offers a systemic and comprehensive evaluation in which data are collected at three levels, including (1) baseline data on the number of courses, hours of tutoring, and students served; (2) data on short-term outcomes of developmental courses, such as course completion rates, grades in courses, and semester-to-semester retention; and (3) long-term outcomes, such as grade point averages, long-term retention, and graduation rates.

For students taking an online course for the first time, it has been found to be important to provide them with a series of activities that prepare them for their online courses (Cowley et al., 2002). This includes receiving clear and complete information on the curriculum, course and degree requirements, nature of faculty-student interaction, assumptions about technological competence and skills, technical equipment requirements, and the availability of support services (Cowley et al., 2002). Specifically, students also need to know what is expected of them as they use technology-based instruction and services, which includes finding content, familiarity with search processes, and some level of skill with basic hardware and software. One exemplar, Florida Community College, has developed a readiness assessment that is used to test how well the students understand and can carry out the requirements of online courses. Rio Salado Community College offers a technical and instructional helpdesk for all online courses; students can contact the helpdesk about academic issues, such as how to prepare for a test, as well as about software and hardware issues or for assistance in establishing internet connections.

McCabe (2003) reinforces the notion that an institution's commitment to the success of its underprepared students is evident in the placement of developmental education within the structure of the organization. He has found that most research supports a centralized program of placement, or one that is well coordinated and managed within the organization. The National Study of Developmental Education conducted in the mid-1990s determined that 52 percent of all developmental education programs in the U.S. were centralized (Boylan, 2002). At the far end of the scale, developmental courses are organized as a single program within an institution. At the other end of the scale, developmental programs are cross-functionally linked to services such as academic support, learning laboratories, and counseling programs.

Several institutions have begun to approach online learning through a systems approach with centralized management and coordination. These institutions involve teams of experts in course development, delivery, and quality control. The goals and tasks for each department focus on supporting online courses and the students who take them. For example, Rio Salado Community College, which has placed many of its courses online, involves both instructors and student services in the process. Its research and development team, which includes faculty, technology experts, student service personnel, and administrators, meets weekly to discuss current issues and future development efforts.

Cases of High-Quality Online, Onsite, and Hybrid Developmental Courses

This section presents examples of institutions that have effectively integrated distance learning into their developmental education programs. In these programs, the degree to which technology is integrated into teaching and learning varies widely. The following clasification system is taken from the Center for Academic Transformation, at which a recent study offered five models of online learning as examples for the various ways that technology can play in students' learning (Twigg, 2003).

Supplemental model. As technology has proliferated across campuses, most instructors now use some form of computer technology to supplement their teaching, including communication tools such as emails and chatrooms, commercial software, and searching tools on the internet. The most common form of technology use is in learning laboratories where students access a variety of supplemental materials. Examples of institutions that have been implemeting this model include Richland College in Texas; Bronx Community College/City University of New York; Piedmont Technical College in South Carolina; and Northwest Visa College of Texas (McCabe, 2003).

Replacement model. The replacement model is a version of a technology-enhanced model where a portion of the course materials are online. For example, students in the Spanish Project at the University of Illinois at Urbana-Champaign work only on communication skills during class meetings. The rest of the course is conducted online, with vocabulary, grammar, and reading presented using web-based tools that provide automatic grading and feedback, maintain deadlines for completion of the material, and automatically send student scores to instructors. An asynchronous discussion board is used where students post messages in Spanish (Twigg, 1999).

Emporium model. Designed by Virginia Polytechnical Institute, this model provides individualized, on-demand support for students taking courses online (Twigg, 1999). Class meetings are replaced with online learning resources that contain online materials as well as on-demand personalized assistance. Learning experiences are designed to help students make the transition from passive learner to active learner. Students work independently and then ask help from tutors, which allows students to control and individualize their learning based on their personal needs. Because the emporium model is not based on a norm of three contact hours per week, the actual amount of time that students spend with instructional assistance (faculty, teaching assistants, and peer tutors) is significantly increased (Twigg, 1999).

Fully online model. A host of institutions have developed their own brands of virtual learning. Examples of this include British Open Univesity, University of Phoenix, and Rio Salado Community College. These fully online models typically centralize coordination in every respect, from standardization of course development, delivery, and instruction to professional training of instructors.

Buffet model. Ohio State University's buffet model offers all options: lectures, individual discovery laboratories (in-class and web-based), group discovery laboratories, individual and group review (live and remote), small-group study sessions, videos, remedial training modules, contacts for study groups, oral and written presentations, and individual and group projects (Twigg, 2001). Richland Community College also employs a similar strategy in its developmental education program (Boylan, 2002).

Examples of Programs Offering Distance Learning Courses in Community Colleges

- *Overview of California Virtual Campus*. California Virtual Campus (CVC) is an online repository of online courses offered by California's institutions of higher education, including two- and four-year state colleges and universities, and some independent colleges (http://www.cvc.edu). The goal of CVC is to be an incubator, particularly for campuses that do not have infrastructure or resources to support the development of distance learning offerings. The CVC Catalog lists 132 schools, 4,863 courses, and 225 programs.

- *ETUDES (Easy To Use Distance Education Software)*. ETUDES is a course management system developed at Foothill College that delivers hundreds of courses to students throughout California. ETUDES is used extensively for the delivery of hybrid and online instruction and for traditional classroom enhancement and management. In 2002, 18,000 students took courses that use ETUDES, including 9,800 at Foothill College. All courses delivered through ETUDES are reviewed by division program-review committees and are not typically created differently from face-to-face courses.

- *ETUDES Alliance*. In 2002, Foothill College created ETUDES Alliance to ensure long-term sustainability of ETUDES and continue the development of the next generation of ETUDES. It hosts only for California community colleges. In 2003, it had 33 colleges in the consortium and 145 faculty who taught online.

- *Colorado Community Colleges Online*. The Colorado Community Colleges Online is comprised of 13 member colleges in the Colorado Community College system, Dawson Community College of Montana, Northwest Missouri State University, and Pickens Tech of Denver (http://ccconline.org/).

- *Florida Community Colleges Distance Learning Consortium.* http://www.distancelearn.org/mainPage.cfm

- *ProjectSAIL*. A project by the League for Innovation, ProjectSAIL aims to provide a foundation for a full-scale national implementation model for development, exchange, and customization of online specialty courses (http://www.league.org/league/projects/sail/about.htm).

Challenges Faced by Developmental Education

This section reviews four major challenges currently faced by developmental education, including increasing demand, fiscal challenges, the availability of high-quality teaching and support, and the challenge of assessment.

Increasing Demand. Community colleges are facing a greater demand for developmental education and a more diverse set of skills and knowledge. More than 40 percent of first-time college students in community colleges are underprepared, and in some urban colleges, three of every four new students are underprepared (McCabe, 2000). Nine percent of America's college students are minorities, but they make up roughly 23 percent of the remedial population (Boylan, Bonham, & Bliss, 1994).

The Fiscal Challenge. The population of developmental education students continues to rise, yet most public

institutions face decreasing resources to support them. California Community College Chancellor's Office (CCCCO) found that California community colleges have difficulty in determining adequate levels of funding for basic skills instruction and service, "partly due to the state's inability to accurately assess the level of current or future needs." While the number of students currently receiving basic skills instruction and services is generally known, there have not been adequate studies on the number of students who are turned away from such courses and services (Study Session on Basic Skills, July 2002).

High-Quality Teaching and Support. Across the country, developmental education courses are most often taught by part-time instructors. This does raise some concern, since there is a good deal of research that shows that developmental students require more personal support and integrated programs involving classes, counseling, learning laboratories, and other support services that require more experienced instruction. A high-tech, high-touch approach that genuinely relates to the needs of developmental students has been shown to assist in student learning.

In McCabe's *National Study of Community College Remedial Education*, he identified the Community College of Denver's Academic Support Center (ASC) as an example of a best-practice effort, in which students served by ASC averaged a 90 percent success rate in classes for which they receive ASC suppport (McCabe, 2003). As part of the program, faculty incorporate computerized assignments using software housed in the ASC into their curricula. Additionally, labs serve as an integral part of the curriculum, and students are required to attend the appropriate lab at least one hour a week. Other services provided by ASC include one-on-one tutoring, case management, peer mentoring, assessment for learning disabilities, small-group work, computer-assisted instruction by faculty, professional and peer tutors, and mentoring (McCabe, 2003).

The Assessment Challenge. In the literature, mandatory asessment and placement have been identified as important effective practices in developmental education. The most

common placement tests used by community colleges are the ASSET and COMPASS produced by ACT, and the Computerized Placement Test produced by ETS.

The Basic Skills Committee at CCCCO found that one of the main challenges in California was that students may concurrently enroll in basic skills and college-level courses. As open-admission institutions, California community colleges do not use pre-admission testing, and there are not standardized measures across the community college system (Study Session on Basic Skills, July 2003).

In terms of assessment training for faculty as a way to improve course completion rates over time, the Center for Academic Transformation at Rensselaer Polytechnic Institute has designed a process used to train faculty to examine the validity of their assessments. The five primary methods faculty can choose from include comparisons of common final exams, common content items selected from exams, pre- and post-tests, student work using common rubrics, and course grades using common criteria (Twigg, 2001).

What Works

Developmental education includes a wide range of interventions and instructional approaches created to help underprepared students be successful in higher education. In this section, literature related to good practices in the design, implementation, and evaluation of online developmental education programs was reviewed. While there are many institutions that have been successful in delivering online developmental education, there is still much research needed to examine the effectiveness of these programs and the impact on these students over time.

This review of research and evaluation in developmental education programs provides an overview of the instructional practices, institutional practices, and program components that have been found to be successful. Table 1 summarizes the components that have been found to be successful in developmental education programs (adapted from Hunter Boylan's article, 1999). The components below have been

documented at various institutions and in many cases are supported by research and literature in the field. However, for developmental education to have the greatest impact on every student, these components must also be translated into consistent practice.

Table 1. What Works? (adapted from Boylan, 1999)

What Works?
• It is important for developmental education to be seen as an integral part of a campus' academic community and to be considered as part of any campus planning effort.
• Developmental education should be delivered by well-trained people.
• Developmental education needs to be student oriented and holistic.
• Developmental education programs must be connected with the college curriculum.
• Developmental education should be well coordinated (*i.e.*, collaborative among instructors, academic advisors, people who run labs.)
• It is important for developmental education to be based on explicit goals and objectives that are shared by all.
• Developmental education needs to incorporate critical skills (critical thinking, metacognition, study skills).
• Developmental education programs should be evaluated using a variety of formative, summative, qualitative, and quantitative evaluation methods.

SECTION II: EFFECTIVE PRACTICES IN ENGLISH AS A SECOND OR OTHER LANGUAGE

This section discusses effective practices in English as a Second Languge (ESL), as well as barriers and challenges to ESL instruction. It first presents current statistics on ESL population and ESL students in community colleges; introduces the most common postsecondary ESL programs; discusses outcomes of ESL education; reviews promising practices in ESL instruction and assessment; and, finally, presents an overview of the issues related to technology and internet use in the delivery of ESL instruction.

Current Statistics on ESL Population and Growing Demand

Several studies cite the increasing trend in immigration to the U.S. as evidence for the increase in demand for ESL education in this country. Research has suggested that the growth of the non-native English-speaking population in the U.S. will only increase the demand for postsecondary English instruction (Curry, 2004; Ellis, 1995; Kuo, 1999; Ignash, 1992; McCabe, 2003). From 1970 to 2000, the percentage of foreign-born people in the U.S. doubled to 10 percent of the overall U.S. population (Szelenyi & Chang, 2001). In 2001, more than 11 percent of the country's household population was foreign born, while nearly one-fifth of America's school-age children spoke a language other than English in the home (McCabe, 2003). Research indicates that the main ESL population growth will be seen in the Hispanic and Asian communities (Fitzgerald, 1995; Kuo, 1999; McCabe, 2003). While the Hispanic communities are expected to triple in size over the next 50 years, Asian groups are expected to grow at an even faster rate (McCabe, 2003). In a 1999 report published from the Community Colleges Board of Governors Office, Asian and Hispanic students comprised more than 81 percent of the ESL students (*California Community Colleges Board of Governors Report*, 1999). Thus, in the future, many of these immigrants will continue to require English language instruction along with postsecondary academic and vocational training to prepare them for work (Kurzet, 1997).

In light of these trends in immigration, ESL education has also witnessed an increase. From 1983 to 1991, ESL grew from 30 percent to 51 percent, as a percentage of all foreign language courses offered in community colleges (Ignash, 1992). In adult education, ESL enrollments tripled between 1980 and 1989. In a recent report published by the National Center for ESL Literacy Education, 42 percent of participants enrolled in state-administered adult education programs were enrolled in ESL classes (NCLE, 2003). Unquestionably, ESL is one of the fastest-growing areas of the community college curriculum (Ellis, 1995; Ignash, 1994; Tichenor, 1994) and the demand for ESL instruction is only expected to grow (Fitzgerald, 1995; NCLE, 2003).

ESL Learners in the Community College

In order to meet the growing demand for ESL instruction, community colleges have come to be viewed as primary resources for these services (Kuo, 1999; Tichenor, 1994; Kurzet, 1997; Ignash, 1995; McCabe 2003). Within community colleges, there is a diverse range of ESL students, with a wide variety of learning needs (Tichenor, 1994). These students consist of three main groups: immigrant and refugee students, international students, and Generation 1.5 students. Refugee and immigrant students make up the majority of ESL students at community colleges (Blumenthal, 2002; Ellis 1999). However, ESL students as a whole do not exhibit homogeneous characteristics. For example, some students have been well educated in their native languages, while many others have not. Other ESL students have attended U.S. high schools for some period of time and are able to function in their daily lives in English. And others enter community colleges with little or no English proficiency (Blumenthal, 2002). Perhaps not surprisingly, ESL students are also not homogeneous in terms of their goals. Some students are academic oriented and plan to continue beyond ESL education, while others simply come for English instruction in order to better navigate through their daily lives (Blumenthal, 2002).

International students make up a subset of ESL students who come to the U.S on student visas and plan to return to

their home countries upon completion of their studies (Brickman & Nuzzo, 1999; Ellis, 1999). These international students make up a small percentage of ESL students in the community colleges and are usually well educated in their native languages and well prepared for college-level work, aside from the need for further language study (Blumenthal, 2002). These international students come to the U.S. from six major areas of the world: Asia (50 percent), Europe (15 percent), Latin America (12 percent), Middle East (7 percent), Africa (6 percent), and North America and Oceania (6 percent). ESL enrollment from three particular countries, China, Mexico, and Brazil, grew at a faster rate than international enrollments in general in the year 2000 (McCabe, 2003).

An industry overview by an English-instruction software company indicated that there are over 70 countries where English is learned as a second language. In countries such as Malaysia, Japan, and India, English language is a standard part of the K-12 curriculum. The English language continues to assert an international presence, leading to the assumption that the demand for English will only grow with time (Ellis, 2002).

Finally, Generation 1.5 students are ESL students who have graduated from American high schools and are U.S. citizens. However, English is not their primary language, either at home or in their social settings. This group demonstrates many characteristics of other ESL students. However, as a result of their exposure to Americans and spoken English at the high school level, these students demonstrate stronger speaking and listening skills (Blumenthal, 2002; Miele, 2003). Thus, Generation 1.5 students resemble both their immigrant relatives and their native-born American peers (Miele, 2003). Generation 1.5 students are typically not well prepared for college courses, due to their limited academic experience (Blumenthal, 2002). Their second-language issues are distinct from those of native English speakers. That is, their grammar and pronunciation difficulties are much different from those of native-speaking remedial students. As a result, traditional ESL classes have not always been able to meet the needs and challenges of this particular group (Blumenthal, 2002; Miele, 2003).

ESL Programs and Outcomes

ESL instruction is provided through the following programs within postsecondary education: (1) Adult Education ESL; (2) Vocational English as a Second Language (VESL) and Worksite ESL; (3) English for Academic Purposes (EAP); (4) English for Special Purposes (ESP); (5) Intensive English Programs (IEP); and (6) English as a Foreign Language (EFL) (Ellis, 1999).

The differences among these programs depend upon the length of stay of the students in the U.S. Some programs, such as Adult Education ESL, VESL and Worksite ESL, and EAP, are designed for ESL students who are permanent U.S. residents, and some other programs, such as ESP and IEP, are intended for international students who will eventually return to their native countries, or for students who wish to study English in their native countries (such as EFL). Table 2 provides detailed descriptions of these ESL programs. Although not included in the table below, it is important to note that English Literacy and Civics programs are also part of ESL programs in postsecondary education. These courses integrate English instruction with civil rights, civic participation, and citizenship education. There has been new interest in developing these types of courses since a specific English Literacy and Civics initiative was enacted by the U.S. Department of Education in 2000 (NCLE, 2003).

Table 2. Postsecondary ESL Programming (from Ellis, 1999)

Program	Description
Adult Ed ESL	English as a Secondary Language (ESL) and English for Speakers of Other Languages (ESOL) are synonymous terms. Adult education programs range from survival- or literacy-level to bridge-level courses for entry into academic ESL programs. The number of levels offered ranges from an average of 3 up to 8 to 10, depending on the size of the population. Adult programs exist in basic and continuing education ESL models.
VESL and Worksite ESL	Vocational English as a Second Language (VESL) is pre-employment English instruction. The ESL instructor works with vocational instructors to develop language competencies germane to the vocational training. Worksite ESL is context adaptive and ranges from language and cross-cultural communication skills for executives and professionals to programs for entry-level workers.
EAP	English for Academic Purposes at two-year and open-admissions four-year institutions is predominantly for immigrants (*i.e.*, permanent U.S. residents). These students are degree seeking or have earned degrees in their native countries. Many have graduated from American high schools but lack the English language skills for college study.
ESP	English for Special Purposes is a catch-all term for unique populations seeking short-term or long-term ESL instruction (*e.g.*, short-term visiting internationals or specific academic grant programs for international students who may also have limited English proficiency). This term is also used for custom-designed ESL programs such as English for International Business.
IEP	Intensive English Programs are most commonly seen at selected admissions universities and English language institutes. They are designed for international students who plan to return to their native countries. These programs are most often self-supporting and provide 15 to 25 hours of instruction per week. Students are admitted to the ESL program and must apply for admission to the university after demonstrating sufficient English language acquisition.
EFL	English as a Foreign Language is instruction in a country where English is not the native language. Some institutions in the United States sponsor these programs at universities abroad and send American instructors. Likewise, many native English-speaking EFL faculty teach English at universities in other countries.

From the aforementioned descriptions, it is evident that these programs take into account the various goals that students have for their English studies. Whereas some students may be more academically oriented, with the intention to attend a four-year university, other students may seek vocational training in order to obtain work. Therefore, the ESL curriculum is by necessity widely varied. ESL coursework typically addresses speaking, listening, reading, and writing skills (Ellis, 1999; Ignash, 1995). A robust ESL curriculum needs to address all of these various aspects of language proficiency across the disparate groups of the ESL populations (Brickman & Nuzzo, 1999; Ellis, 1999).

In terms of the impact of ESL instruction, overall, ESL courses appear to have a positive effect on student success. One study of the California Community Colleges found that ESL students were likely to continue their education and complete basic skills courses, transfer courses, vocational courses, and degree-applicable courses (*California Community Colleges Board of Governors Report*, 1999). Another study found that basic literacy instruction helped enhance employability and job performance and helped students obtain better jobs than the ones held prior to enrolling in ESL instruction (Fitzgerald, 1995). Geradi (1996) compared academic outcomes of ESL students to the native-speaking student population, using specific academic indicators, such as grade point average (GPA), progress toward degree completion, and total credits earned over 10 semesters of study. The study concluded that overall, ESL students performed lower in these three indices than their native-speaking counterparts, even though a comparison of ESL students with the general student population was difficult to interpret and therefore not necessarily valid.

Promising Practices in ESL: Instruction and Assessment

Instruction. Because of the diverse needs of ESL students, there is an increasing recognition of the need for tailored, individualized (Ellis, 1995; Kurzet, 1997; Model ESL…Programs, 1995), and flexible instruction (NCLE, 2003; Tichenor, 1994). Flexibility applies not only to academic instruction, but also to life-skills and vocational training (NCLE, 2003).

Flexibility and individualization also integrate language acquisition with content teaching (Curry, 2004; NCLE, 2003). ESL coursework should integrate language, content (subject matter), and teaching of higher order thinking skills, so that language is not taught in isolation (Ellis, 1995). Furthermore, multiple instructional approaches and techniques can also help address the multiple needs of the ESL population (McCabe, 2003; NCLE, 2003).

One instructional strategy that has recently emerged is that of learning communities in which courses or coursework are linked together in order to provide a more collaborative approach to learning, which often includes team teaching and interdisciplinary themes. Gabelnick, et al. (1990), describe the purpose of learning communities as helping to provide greater coherence with what students are learning, as well as increased intellectual interaction with faculty and peers.

Learning communities can be used to minimize many of the upsets and confusion that ESL students face as they attempt to navigate through their new linguistic, social, and cultural environments (Mlynarczyk & Babbitt, 2002). Positive academic outcomes, such as increased persistence and higher retention rates, have been associated with learning communities (Curry, 2004; Mlynarczyk & Babbitt, 2002). Learning communities also encourage camaraderie among students, thus serving both their social and academic needs (Barrett & Wootten, 1994; Mlynarczyk & Babbitt, 2002).

Mlynarczyk and Babbitt (2002) emphasize how learning communities can encourage collaboration across an institution. Ongoing communication and collaboration among tutors, instructors, and students and across disciplines and departments provide a community and network of support for ESL students. Instructors working with support-services groups such as career and degree planning, financial-aid advisement, and residency information services have also been found to play a strategic role in the success of ESL students (McCabe, 2003). The importance of these support services for improving ESL instruction has been greatly highlighted throughout the literature (Ellis, 1995; McCabe, 2003; Model ESL…Programs, 1995).

Furthermore, many programs in community colleges work in partnership with other organizations, *e.g.*, business corporations, community-based organizations, other educational institutions, and government organizations, in providing ESL instruction (Tichenor, 1994; Model ESL…Programs, 1995), which enforces a much-needed link to the workplace for the ESL student.

Assessment. Research suggests that any form of ESL assessment should be placed within a larger system of program evaluation and monitoring (McCabe, 2003; NCLE 2003). McCabe asserts that it is important that assessments are part of a broader system of tracking and monitoring to ensure that students make continued progress. In this way, program staff and students are able to work together to set goals and objectives for the program and develop measures that allow them to assess the progress of the program (Holt & Van Duzer, 2000).

Thus, it is important to initially define and identify the purpose of assessments and then make sure that the selected instruments match the program's goals (NCLE, 2003). In addition, assessment instruments need to be specifically devised for non-native English speakers (McCabe, 2003). It is also important that multiple measures (*e.g.*, standardized assessments, performance assessments, portfolios) are used to present a more complete picture of the students' education and progress (NCLE, 2003). Finally, assessment results need to be shared among the wider learning community, instructors, and staff as a basis for decision making about program planning and instruction (National Research Council, 2002; Van Duzer & Berdan, 1999; Wrigley, 2001).

Technology Use and Online ESL Programs

Online ESL is a term used to describe two types of programs: (1) full delivery of ESL content through the internet; and (2) the use of the internet and other computer-assisted tools to supplement ESL instruction in the classroom. Private companies and industry are more enthusiastic about the first modes of ESL delivery, seeing virtual English instruction as a more commercially viable alternative to the traditional modes of delivery (Ling, 2001). Furthermore, many of these

internet-delivery models are geared toward international ESL students who reside in their native countries (Ling, 2001). Yet education specialists continue to view online ESL as a supplemental tool to classroom-based instruction (Cassidy, 1996; Ellis, 1995; McCabe, 2003). Therefore, these hybrid models are the most recommended forms of online ESL (Ellis, 1995; McCabe, 2003; NCLE, 2003).

The adaptability and flexibility of technology make it very appealing for ESL, given the wide variety of program types, content needs, instructional settings, and student goals and objectives. Like online learning in general, the use of online ESL learning presents opportunities to meet multiple instructional goals and to meet the needs of students who have different learning styles (NCLE, 2003). Online ESL can facilitate learning through individualized activity stations, self-access learning labs, and online courses (Burt, 1999; Gaer, 1998; Hacker, 1999; Hawk, 2000; Terrill, 2000). Online ESL programs can allow students to be more self-directed with their studies. ESL programs that take into consideration the specific goals and needs of students have been able to make the best use of online capabilities (Reynard, 2003).

One promising practice is the use of email-based coursework to facilitate more authentic communication and interaction to improve writing skills (Al-Jarf, 2002; Cassidy, 1996; Shih & Cifuentes, 2000). In one case of email coursework, students were able to practice a variety of language skills (writing, question formation, and interview technique) (Cassidy, 1996). In turn, these exercises generated valuable grammar review lessons by providing concrete and personal examples from which students could learn and correct their mistakes. From Cassidy's example, these students made great improvements in their writing techniques. Other studies also indicate that the use of email for writing activities can provide positive perceptions of English learning (Shih & Cifuentes, 2000).

Another example of online ESL is Miami Dade College's e-writing program (Donahue, 2003). This is an online writing lab consisting of a repository of more than 500 hours of web-deliverable ESL learning objectives. Each learning objective

consists of a one-hour self-contained, reuseable item of online instruction that teaches one discrete learning objective. Before each lesson, students are given a pre-test of the target concept, and at the end of each lesson, students are given a post-test to measure learning. The learning objectives and content were created by curricular experts and writing teams within Miami Dade College. Currently, they are developing and piloting the content; however, this program appears promising for its wide array of software used to accommodate multiple learning styles and to target multiple ESL skills.

While education specialists advocate a hybrid approach to online learning for ESL, more research needs to be done on varying online delivery models. For example, as online instruction begins to make better use of available technologies, audio software can be used to improve listening and pronunciation skills. More research needs to be done in these areas to build more comprehensive online ESL models. Additionally, while the growing demand for ESL instruction is apparent, defining success and measuring outcomes appear to be problematic because of the large amount of diversity in ESL adult populations in terms of background, objectives, and needs. Purely academic indicators may not address the vocational nature of some students' goals, while employment numbers may not take into account the academic goals of other students. Traditionally, ESL instruction has focused on academic ESL instruction (Kuo, 1999), yet there does not appear to be one set of uniform standards used to measure outcomes for all groups of the ESL population.

SECTION III: ASSISTIVE TECHNOLOGIES

This section describes various types of assistive technologies that can be used by students with learning disabilities, primarily at the postsecondary level. Additionally, it reviews issues that apply to accessible distance learning, such as universal design and accessible web design. Promising practices from the field and approaches for integrating assistive technology into basic online education are also outlined.

In the U.S., the Technology-Related Assistance for Individuals with Disabilities Act of 1988 (Section 3.1. Public Law 100-407, August 9, 1988) defined assistive technology as "any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is commonly used to increase, maintain, or improve functional capabilities of individuals with disabilities."

Schmetzke (2001) estimated that a half-million students with disabilities attend higher educational institutions in the U.S. The National Center for Education Statistics reported that students with disabilities are served by 98 percent of two-year and four-year public institutions, 63 percent of private four-year institutions, and 47 percent of private two-year institutions (NCES, 2000). Research has found that individuals with disabilities are underrepresented in postsecondary education when compared with their nondisabled counterparts and are less likely to complete their studies and earn a postsecondary degree (Horn & Berktold, 1999; National Council on Disability, 2000).

Learning disabilities are the most frequently reported learning difficulties among freshmen students (Henderson, 2001). Learning-disabled students accounted for 40 percent of the total population of students with disabilities in 2000 (up from 16 percent in 1988), partially as a result of improved research and diagnostics, as well as the fact that there are more services to accommodate those with learning disabilities, possibly resulting in an increase in the number of people willing to acknowledge and report their learning disabilities. Students reporting other types of disabilities include 16 percent with blindness or partial sight, 15 percent

with health-related impairments, 9 percent with hearing impairments, 7 percent with orthopedic impairments, 3 percent with speech impairments, and 17 percent with other impairments (Henderson, 2001).

Barriers to the Use of Assistive Technology

A number of barriers that impede access to and full use of technology by students with disabilities have been identified. One of the main barriers cited is the lack of accessible distance education environments. Burgstahler (2002), Opitz, Savenye, and Rowland (2003) and Schmetzke, (2001) have illustrated how the design of many web pages, instructional software programs, and other technological products is not in compliance with accessibility guidelines. As a result, these tools cannot be fully accessible to people with disabilities.

Policy experts and researchers have several major obstacles in the development of accessible technological learning, including the lack of technical skills and knowledge by those involved in web design and assistive technology products and the lack of funding to purchase assistive technology (National Council on Disability, 2000; Fichten, Barile, & Asuncion, 1999). It is reportedly quite common for educational institutions to purchase products with inaccessible characteristics or develop electronic resources and educational software that are inappropriate for students with disabilities (Burgstahler, 2002).

The National Council on Disability (2000) determined that educational technology has not sufficiently addressed the needs of students with disabilities, in part because of the rapid acquisition of educational technologies. It is only recently that access to technology for students with disabilities has been identified as an important factor in the purchasing of educational technology. Cook and Gladhart (2002) found that a lack of knowledge about those who might need and use assistive technology has contributed to the purchase of a significant amount of technology-related resources that have not necessarily resulted in increased access for students with disabilities. Green (2000) reported that the failure to incorporate technology in teaching was one of the main concerns of instructional technology leaders on

college campuses. Furthermore, graduates of teacher education programs often do not have enough technical experience and skills in the general use of computers and in teaching with technology (Anderson & Pelch-Hogan, 2001; Hasselbring & Glasser, 2000). Hasselbring and Glasser noted that this is of utmost importance, since inadequate teacher training "has an especially strong impact on students with disabilities, because technology is often a critical component in planning and implementing an educational program for these students" (p. 118). Table 3 lists examples of hardware and software designed to assist users with disabilities. (Table adapted from Cook and Gladhart, 2002.)

Table 3. Examples of Software and Hardware Options for Users With Disabilities (from Cook & Gladhart, 2002)

Category	Type	Name
Software/Media	Speech output (Read text on the computer screen)	eReader JAWS Easy Access Write OutLoud
	Voice recognition software (Translates voice into text)	Dragon Dictate SimplySpeaking ViaVoice
	Graphic organizing software (Used to show concepts graphically)	Inspiration SmartDraw
	Scanning (Necessary for turning printed text into readable text for speech output software)	OpenBook WYNNWizard
	Screen magnifiers	ZoomText
	Self-voicing browsers	WebSpeak IBM Home Page Reader
Hardware	Compact disks with electronic text for screen readers Portable note takers for video conferencing, reading assignments, or research	VoiceNote AlphaSmart portable computer companion HandSpring with portable keyboard or Total Recall voice recorder
	Microphones for voice input	
	Scanners for text input	

Making Distance Learning Accessible to All

Universal design is defined by the National Center for Universal Design at North Carolina State University as "the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" ("What is Universal Design?," 2002, p. 1). The seven principles of universal design assert that (1) the design is useful and marketable to people with diverse abilities; (2) the design accommodates a wide range of individual preferences and abilities; (3) use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level; (4) the design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities; (5) the design minimizes hazards and the adverse consequences of accidental or unintended actions; (6) the design can be used efficiently and comfortably, and with a minimum of fatigue; and (7) appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility (Connell, Jones, Mace, Mueller, Mullick, Ostroff, Sanford, Steinfeld, Story, & Vanderheiden, 1997).

Accessible Web Design. Applying universal design principles makes web pages accessible to individuals with a wide range of disabilities. Essentially, there are two methods for ensuring that web design is content and navigation accessible. One method is to avoid certain kinds of inaccessible data and features, and another is to develop alternative ways to ensure that a page has accessible features and format (Burgstahler, 1998). For example, a graphic that is inaccessible to a blind individual needs to be avoided, or a text alternative should be created that describes the inaccessible content to those who are blind. Web pages for a distance learning class can be tested with a variety of monitors and computer platforms and using several web browsers. Special programs (*e.g.*, A-Prompt, Bobby, WAVE) are available to test web pages for accessibility.

WebAIM offers a web accessibility checklist based on Section 508 standards[1], instructions on how to meet the standards, and training on web accessibility issues (WebAim, 2001). The Center for Applied Special Technology has a web service (Bobby) that offers suggestions for meeting accessibility guidelines and allows web designers to test their pages and repair any problems before they post them (Cast, 2000).

Blackboard and WebCT provide information on their websites on how their products meet the Americans With Disabilities Act (ADA)[2] and Section 508 guidelines and whether their products abide by the terms of the Technology Related Assistance for Individuals with Disabilities Act of 1988 (Schmetzke, 2001).

Michigan Virtual University (MVU), a private not-for-profit organization that provides online education and training, is an example of a promising practice of universities creating and supporting accessible distance learning education. MVU's course catalog includes a range of course subjects (from computer-related skills, information, and technology to medical training and manufacturing), of many levels of difficulty (high school courses, advanced placement courses, and community college courses). MVU has developed a set of standards (MVU, 2002) to guide instructors in the design of their online courses that cover technology, usability, accessibility, and instructional design. Accessibility is being treated as an important issue that is openly addressed, rather than as an afterthought.

1 In 1998, Congress amended the U.S. Rehabilitation Act of 1973 with Section 508, which requires that individuals with disabilities who are members of the public seeking information or services from a federal agency, have access to and use of information and data that is comparable to that provided to the public who are not individuals with disabilities, unless an undue burden would be imposed on the agency.

2 The Federal Americans With Disabilities Act (ADA) is the Federal Law that makes it illegal for employers to discriminate on the basis of a disability. It makes it illegal for an employer to discriminate against a qualified individual with a disability in job application procedures; the hiring, advancement, or discharge of employees; employee compensation; job training; or other terms, conditions, and privileges of employment, because of the individual's disability.

Next Steps for Integrating Assistive Technologies Into Basic Online Education

Burgstahler (2003, p. 15), in her article titled "The Role of Technology in Preparing Youth With Disabilities for Postsecondary Education and Employment," describes a series of important steps that need to be taken in order for students with disabilities to take full advantage of the benefits technology has to offer:

- *Policies, standards, and procedures should be established in order to assure that accessibility is taken into consideration when technology is purchased or developed.*

- *Policies, standards, and procedures should be established and training and support services should be provided to ensure that web pages, library resources, labs, and distance learning programs are accessible to everyone.*

- *Funding should be secured for the purchase of appropriate assistive technology.*

- *Collaboration on planning, funding, selecting, and supporting assistive technology should be an ongoing process among all stakeholders (educators, librarians, parents, support staff, and computer lab managers).*

- *All stakeholders should have access to training on how to design accessible distance learning environments; select accessible hardware and software; purchase appropriate assistive technology; and assure that disabled students take full advantage of technology.*

- *Legislators and policymakers should work on clarifying existing legislation, using consistent terminology and standards, and should inform all stakeholders about current laws, policies, and resources. Inconsistencies and gaps regarding the selection, funding, and support of assistive technology should be identified and corrected.*

- *Students with disabilities should be included at all stages of decision making related to assistive technology – from the selection and purchase of appropriate technology to support services and use.*

- *Students with disabilities should be specifically instructed how to use technology to maximize their independence, productivity, and participation in academic and employment settings and in their private lives. They should also be taught how they can use technology to transition successfully between academia and employment.*

- *Students with disabilities at high school and college levels should be encouraged and given opportunities to participate in internships and other work-based learning experiences.*

Electronic and information technology can provide remarkable opportunities for students with disabilities and significantly contribute to their success in postsecondary studies. This section has reviewed assistive technologies that have been developed to provide functional alternatives to students with learning disabilities and mobility and sensory impairments. Even though technology has the potential to be more valuable for people with disabilities than for people without disabilities (Hasselbring & Glaser, 2000), technologies continue to erect barriers for some individuals with disabilities. The full potential of technology will not be achieved without secured funding; assistance for all stakeholders to become more knowledgeable about technology; requirements that education institutions meet all legal mandates related to assistive technology; and the development of policies, standards, and procedures that enhance disabled students' independence, participation in academia, and productivity (Burgstahler, 2003).

APPENDICES

SECTION I: DEVELOPMENTAL EDUCATION

Appendix A: Criteria for Effective Practices in Developmental Education

Sources:

What Works: Research-Based Best Practices in Developmental Education by Hunter R. Boylan, (2002). Boone, NC: Continuous Quality Improvement Network with the National Center for Developmental Education, Appalachian State University.

High Stakes, High Performance: Making Remedial Education Work by Suzanne and John E. Roueche, (1999). Washington, D.C.: Community College Press.

No One to Waste: A Report to Public Decision Makers and Community College Leaders by Robert H. McCabe, (2000). Washington, D.C.: Community College Press.

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Appendix B: Criteria for Effective Practices in Online Learning

Sources:

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Available: http://www.aft.org/higher_ed/downloadable/distance.pdf

Principles of Good Practice for Electronically Offered Academic Degree and Certificate Programs. A paper from the Western Cooperative for Educational Telecommunications.
Available: http://www.wcet.info/projects/balancing/principles.asp

Five Pillars of Quality Online Education by George Lorenzo and Janet Monroe, (2002). A national report sponsored by the Alfred P. Sloan Foundation. http://www.sloan-c.org/effective/pillarreport1.pdf

Innovations in Online Learning: Moving Beyond No Significant Difference by Carol Twigg, (2001). A monograph sponsored by The Pew Learning and Technology Program.
http://www.center.rpi.edu/PewSym/Mono4.html

Appendix C: Useful Resources

National Organizations for Developmental Education
- National Association of Developmental Education http://www.nade.net
- National Center for Developmental Education http://www.ncde.appstate.edu/
- Center for Academic Transformation http://www.center.rpi.edu
- Sloan Consortium (Sloan-C) http://www.sloan-c.org
- Sofia Project http://sofia.fhda.edu/

National Organizations for Distance Learning
- Asynchronous Learning Network http://www.alnresearch.org
- Institute for Higher Education Policy http://www.ihep.com/
- American Distance Education Consortium http://www.adec.edu/
- Center for Media Literacy http://www.medialit.org/
- Distance Education Clearinghouse http://www.uwex.edu/disted/home.html
- Distance Education and Training Council http://www.detc.org/
- Distance-Educator.com http://www.distance-educator.com

Distance Learning Links
- http://Webster.commnet.edu/HP/pages/darling/distance.htm
- Outreach and Technical Assistance Network: http://www.otan.us/login/login.cfm
- National Education Association: http://www.nea.org/index.html
- United States Distance Learning Association: http://www.usdla.org/

SECTION II: EFFECTIVE PRACTICES IN ENGLISH AS A SECOND OR OTHER LANGUAGE

Appendix A. Useful Resources

- Center for Adult English Language Acquisition: http://www.cal.org/caela/
- TESOL International Research Foundation: http://www.tirfonline.org
- British Council: http://www.britishcouncil.org/
- British Council Online English Materials – an exemplary site with great content: http://www.learnenglish.org.uk/
- Example of individual Online ESL Content Site: http://www.eslcafe.com

SECTION III: ASSISTIVE TECHNOLOGIES

Appendix A. Useful Resources

- Distance Education: Access Guidelines for Students with Disabilities: Guidelines for California Community Colleges (http://www.htctu.net/publications/guidelines/distance_ed/disted.htm)
- Section 508 Guidelines: Accessible IT standards used by the federal government (http://www.section508.gov/)
- WAVE: Web Accessibility Tool (http://www.wave.Webaim.org/index.jsp)
- A-Prompt: Web Accessibility Verifier (http://aprompt.snow.utoronto.ca/)
- Bobby (http://bobby.watchfire.com/bobby/html/en/index.jsp)
- ABLEDATA Sponsored by the National Institute on Disability and Rehabilitation Research, U.S. Department of Education (http://www.abledata.com)
- Education World Assistive Technology (http://www.educationworld.com/special_ed/assistive/index.shtml)
- Web Accessibility Initiative (WAI) (http://www.w3.org/WAI/)
- Illinois Assistive Technology Project Demonstration & Loan Center (http://www.iltech.org/)
- Closing the Gap (http://www.closingthegap.com/index.lasso)
- CAST: Center for Applied Special Technology (http://www.cast.org/)
- Alliance for Technology Access (http://www.ataccess.org/)

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League for Innovation
in the Community College

4505 East Chandler Blvd, Suite 250
Phoenix, Arizona 85048

(480) 705-8200
Fax (480) 705-8201