

# A Backward Glance on Optometric Education: Institutional Profile of Schools and Colleges of Optometry

Shilpa J. Register, OD, MS, FAAO

## Abstract

*This paper discusses the rich history, current institutional profile and future of optometry schools and colleges in the United States in relation to core competencies. The optometric profession arose from the public's need for eye care and its unavailability within the United States in the early 1600s. Optometry schools began as informal proprietary colleges and have become formal, structured, accredited four-year programs that offer a Doctor of Optometry (OD) degree as well as other degrees in physiological optics and vision science.*

**Key Words:** *History, optometric education, optometric demographics, core competency*

*Dr. Register is a Clinical Associate Professor at The Ohio State University College of Optometry. She is currently pursuing a PhD in Educational Policy and Leadership in the College of Education and Human Ecology at The Ohio State University. Dr. Register is active in the American Academy of Optometry, serves as the Association of Schools and Colleges of Optometry representative for the Consultation Group on Interprofessional Professionalism, and recently received the Michael G. Harris 2010 AOF Ezell Fellowship.*

## Introduction

The optometric profession arose from the public's need for eye care and its unavailability within the United States in the early 1600s. Optometry schools began as informal proprietary colleges and have become formal, structured, accredited four-year programs that offer a Doctor of Optometry (OD) degree as well as other degrees in physiological optics and vision science. In the past five years, optometric education has seen a rise in the number of optometric educational institutions. Also, over the past 50 years, the profession has steadily grown and developed from one of refractionists to one of primary care healthcare providers for the eye. In light of these trends, reflecting on the past history of the profession, its current status and future will provide an enlightening overview of the development of the profession.

In this respect, it is important to understand the history of educational institutions to fully understand the history of professions and their relative impact on society. This information can be used as a tool for reflection and guidance for current and future institutions as well as assist students in better understanding the roots of their profession. Furthermore, the history of optometry can help guide our future and bears weight on discussion of important concepts such as core competencies. This paper will discuss the rich history, current institutional profile and future of optometry schools and colleges in the United States, and core competency development.

## History of Schools and Colleges of Optometry

In 1620, the first pair of spectacles arrived in the New World. Over the next 250 years, there was a strong force to hasten optometry's development from its roots as an optical business into a healthcare profession. Originally, the trade profession of optics was learned through apprenticeship. Charles Prentice fought for standards to ensure that the public received the finest optometric service. Then, the profession of practicing refractionists evolved to meet the needs of the public; however, lenses

were only available in Europe. In 1833, jewelry businessmen began to produce spectacle frames in Massachusetts. By 1852, the demand grew, and approximately 15,000 frames were made per year.<sup>4</sup> Between 1890 and 1900, many spectacle lenses and optical instruments were produced in the United States, thereby decreasing our dependence on Europe.

In 1907, the first school of optometry, the Needles Institute of Optometry, was established in Kansas City, Mo. It eventually relocated to Chicago to merge with the Northern Illinois College of Optometry.<sup>5</sup> In 1905, the Massachusetts School of Optometry was established from the reorganization of the Klein School of Optics, which began in 1894 with a mission to instruct opticians on the diagnosis of diseases of the fundus using the ophthalmoscope.<sup>6,7</sup> The Massachusetts School of Optometry was later renamed as the New England College of Optometry (NECO) in 1976. All three schools were based in Boston, although there were several relocations between different buildings.<sup>8,9</sup>

The Illinois College of Optometry (ICO) was formed in 1955 with the merger of the Chicago College of Optometry and the Northern Illinois College of Optometry, which were founded in 1946 and 1926 respectively.<sup>4</sup> The Northern Illinois College of Optometry had its roots within the Chicago College of Ophthalmology and Otology, established in 1872, where opticians were trained by physicians on the use of practical methods using prisms and on detection and correction of optical defects using the ophthalmoscope.<sup>10,11,12</sup>

Additionally, the Los Angeles College of Optometry began in 1921 from the Ketchum School of Optics that was established in 1904 and later became the Southern California College of Optometry (SCCO).<sup>6,13</sup> All three of these institutions had many changes and relocations that mimicked the many changes that the optometric profession underwent. Southern California College of Optometry, Illinois College of Optometry and New England College of Optometry all originated from optics schools at a time when the optometric profession did not exist.

Concurrently, courses were offered to optometrists throughout the country, hence the beginning of optometric education and the profession as we know it today.<sup>4</sup> In 1900, the American Optometric Association (AOA) elected its first president. The AOA aimed to support optometrists through legislative processes. In 1915, the AOA passed a resolution that defined the minimum length of optometry courses. This resolution required upgrading the original optometry schools, including the disqualification of 20 schools.<sup>4</sup>

In 1914, the first public college of optometry, The Ohio State University, was founded. It granted its first degree in 1915, a Bachelor of Science in Optometry.<sup>6</sup> From 1894-1932, five additional private schools and colleges of optometry were established.<sup>14</sup> In 1927, Pennsylvania College of Optometry was the first institution to grant a Doctor of Optometry degree after completion of a four-year curriculum.<sup>6</sup> In 1922, the American Academy of Optometry (AAO) was founded with 11 charter members. Their mission was to increase the professionalization of optometry and move away from commercial optometry.<sup>15</sup> The AAO conducted post-graduate courses and encouraged the formation of local chapters nationally and internationally.<sup>6</sup> It also began to hold annual meetings to serve as a forum and meeting place for optometrists where continuing education and research is highlighted.<sup>6</sup>

By 1925, a committee of volunteers, known as the Council on Optometric Education (COE), was appointed to accredit optometric education institutions. The COE became the current optometric accreditation body known as the Accreditation Council on Optometric Education (ACOE). Optometric education began to flourish over the next 10 years, reaching a pinnacle when OSU offered a PhD degree in physiological optics under the direction of Dr. Glenn A. Fry. From 1935-1955, optometric education grew to encompass a formal curriculum, which was a six-year professional course consisting of a two-year liberal arts program combined with a four-year specialized professional education.<sup>6</sup>

In 1947, the American Optometric Foundation (AOF) was created to promote the growth of optometric science through support of graduate students in vision science research.<sup>4,6</sup> Initially, the AOF was primarily funded from within the profession, but as more public and governmental agencies relied on it for guidance in vision research and care, the funding for the AOF expanded to include the public.<sup>6</sup> The AOF has played an important role in shaping and supporting optometric education through its support of researchers and educators.<sup>6</sup>

From 1945-1988, eight additional public colleges of optometry and one additional private school were established.<sup>14</sup> This growth in public and private institutions parallels the immense growth of undergraduate and graduate institutions across the United States.<sup>1,16</sup>

## Current Status of Optometric Education

At this time, there are a total of 23 accredited schools and colleges of optometry. Twenty are members of the Association of Schools and Colleges of Optometry (ASCO), and three are affiliate members of ASCO. The 20 member schools are located within the United States and Puerto Rico, and the affiliate members are located in Canada and Columbia.<sup>17,18</sup> The 20 ASCO member schools within the United States and Puerto Rico are shown in Table 1 with their founding dates, class size and institutional organization. All 20 of the schools and colleges offer a four-year optometric curriculum granting the Doctor of Optometry degree.

Most optometry schools strongly recommend if not require a bachelor's degree for applicants.<sup>20</sup> New England College of Optometry offers additional unique degree programs for foreign-trained optometrists that encompass an abridged curriculum.<sup>26</sup> Other schools offer dual degree programs whereby students interested in research and public health can receive an additional Master of Science, Doctorate of Philosophy or Master in Public Health degree.<sup>20</sup> In the past 40 years, the number of schools and colleges of optometry has almost doubled. Furthermore, there are three additional institutions, Western Uni-

versity of Health Sciences, Midwestern University Arizona College of Optometry and University of the Incarnate Word, whose optometry programs had been granted preliminary approval by the ACOE and were preparing to admit their first incoming classes in Fall 2009.<sup>21,24,25</sup>

## Future of Optometric Education

In 1968, Hirsch and Wick predicted the creation of additional university-affiliated colleges resulting in a total of 20 university-affiliated schools to completely attain optometry's professional status and fulfill the optometric demand placed by society. They advocated the replacement of independent schools and colleges with university affiliation to promote professional recognition as evidenced by the history of dental and pharmacy schools, but recognized the important contributions made by the independent schools and colleges of optometry.<sup>6</sup>

Recently, many healthcare professions recognized by society, including medicine, nursing and pharmacy, have retained their professional status in society while offering education through both university-affiliated and independent schools and colleges.<sup>27,28,29</sup> Therefore, the prediction of all educational institutions being university-affiliated seems to be an unrealistic goal for our profession if we are to continue to serve all members of society. We must remember the importance of all optometric educational institutions as they serve our profession and continue to contribute to society as stated in the AOA mission.<sup>30</sup> Our profession has changed as rapidly as society in general has changed.<sup>31</sup> We must remain at the forefront of education by constant evaluation of our academic programs, curriculum, faculty needs, student expectations and institutional mission, vision, goals and objectives.

The history of optometry schools is important because it is one of the few professional schools that began as proprietary schools with a commercial focus.<sup>4,6</sup> Both the change in pedagogy and change in ethnic demographics have been slow in optometry, which is consistent with other educational pro-

**Table 1**  
**Historical Perspective of U.S. Public & Private**  
**Optometry Schools and Colleges**<sup>4,6,17,19,20,21,22,23,24,25</sup>

Name of Institution	Founding Year	Private/ Public	Number of Students/ Yr
Illinois College of Optometry (ICO)	1872	Private	158
New England College of Optometry (NECO)	1894	Private	115
Southern California College of Optometry (SCCO)	1904	Private	98
Inter American Univ. of Puerto Rico (IAUPR)	1912	Private	50
The Ohio State University (OSU)	1914	Public	64
Pennsylvania College of Optometry at Salus University (PCO)	1919	Private	155
University of California at Berkeley (UCB)	1923	Public	60
Southern College of Optometry (SCO)	1932	Private	123
Pacific Univ. College of Optometry (PUCO)	1945	Private	89
Indiana University (IU)	1951	Public	78
University of Houston (UH)	1952	Public	105
University of Alabama at Birmingham (UAB)	1969	Public	44
State University of New York (SUNY)	1970	Public	72
Michigan College of Optometry (MCO-FSU)	1975	Public	36
University of Missouri - St. Louis (UMSL)	1980	Public	44
Northeastern State University - Oklahoma College of Optometry (NSU-OCO)	1988	Public	26
NOVA Southeastern University (NOVA-SE)	1989	Private	101
Western University of Health Sciences (WesternU)	2009	Private	70
Midwestern University - Arizona College of Optometry (AZCOPT)	2009	Private	50
University of the Incarnate Word (UIW)	2009	Private	60

fessions.<sup>32</sup> The futures of optometry schools and the optometric profession depend on their current actions and objectives to meet the needs of the public and the future students. Educational institutions need to focus on their unique differences as defined by their mission and vision to remain viable in the future and must remain cognizant of their rich past.

## Competency in Healthcare Professions

What is the relationship between the development and continuation of our profession and optometric education? Historically, it has been shown that optometric education has been at the forefront and was instrumental in developing our profession. Now, there are additional stakeholders and facets

to optometry. Healthcare professionals are held to a certain standard by the public and are expected to be competent and qualified. The public expects state boards to ensure competency in their healthcare professionals as well as active involvement in maintenance of competence initiatives.<sup>33</sup> Competency has been defined as the ability to perform a job adequately. However, an education curriculum should prepare students to not only be competent as defined, but also to have the pertinent skills and knowledge necessary to represent competent professionals.<sup>34</sup> This skill set represents core competencies that all healthcare professionals must understand before practicing in their profession.

## Empirical Studies

The literature contains many articles on the benefits of core competencies for various professions as well as benefits of competency-based education.<sup>35,36,37,38,39,40</sup> Most healthcare professions have adopted a competency-based education curriculum through extensive education reform, some of which was introduced by outside sources such as the government or the public.<sup>36</sup>

Competency-based education has the potential of improving the quality of education and the quality of the students. Much of the emphasis on education reform towards a competency-based model has been on improving the talents, aptitudes and abilities of the students, thereby improving their quality of life.<sup>35</sup> In healthcare professional education, the benefits in quality of life extend to the patients and towards their quality of care, hence, the heavy involvement from federal agencies to ensure that the public receives valuable, quality healthcare.

## Roles of Regulatory Boards and Professional Organizations in Policy Development and Implementation

In 2000, a Committee on Attributes from ASCO compiled and developed competency statements focused on knowledge, skills and professionalism. Table 2 explains each competency category.

**Table 2**  
**Competency Statements from ASCO<sup>41</sup>**

Knowledge
knowledge of basic body systems, processes and causes leading to dysfunction or disease, mechanisms of action of pharmaceutical agents, structure and processes contributing to refractive error, optics of the eye and ophthalmic lens systems, visual development and visual function, vision therapy and rehabilitation, understanding of psychosocial forces affecting patients, practice management strategies and structures, and elements related to clear verbal and written communication
Skills
cognitive and motor skills necessary to prevent, diagnose, treat and manage clinical conditions within the optometric scope of practice
Professionalism
<p>Personal - including a commitment to life-long learning, incorporation of ethical principles into patient care decisions, problem solving and critical thinking skills, and the recognition of one's personal limitations in patient care</p> <p>Professional - including application of professional ethics and standards in the practice of optometry, demonstration of honesty and integrity, respect for patients and commitment to confidentiality, understanding potential conflicts of interest in health care, and a commitment to active involvement in organized optometry</p>

However, I argue that competency is much more than knowledge and skills. Core competencies should also include demonstrable critical thinking skills, communication skills, and the integration and application of knowledge and skills.<sup>34</sup> Psychosocial and interprofessional competencies are usually introduced during the last two years of the optometric program when students are performing their clinical rotations but should be intertwined throughout the entire curriculum.

## Core Competency Development

The development of core optometric competencies needs to include needs of the public, standards of the profession and attainable objectives of educational curriculums. General core competencies in other healthcare professions such as medicine have focused on patient care, medical knowledge, practice-based learning and experiences, interpersonal and communication skills, professionalism, and systems-based practice, which is a more inclusive definition.<sup>42</sup>

Competencies must also address global and interprofessional concerns or needs. There is much disparity in the scope of practice and the definition of an optometrist from a global perspective; however, vision care has a dramatic effect on individuals and communities throughout the world. There are global

conferences and organizations focused on education and public health in vision care that can be used as a resource to expand core competencies to involve global needs, concerns and expectations.

Reimers claims that schools and colleges are not preparing their students for global challenges and consequences that include a lack of internationalization.<sup>39</sup> It is predicted that over the next 15 years, there will be major changes globally as related to politics, environment and healthcare. Students must have global competency that has been defined as the knowledge and skills necessary to cross disciplines, comprehend global events and respond effectively.<sup>39,43</sup>

Interprofessionalism has been defined as the interaction between practitioners from different healthcare professions to improve quality of patient care.<sup>44</sup> It also involves interaction and collaboration between professionals who understand each other's disciplines. Interprofessional professionalism has been defined as the "consistent demonstration of core values [and the application of] altruism, excellence, caring, ethics, respect, communication and accountability to achieve optimal health and wellness [in patient care]".<sup>45</sup> Interprofessional behaviors and skills must also be included in competencies with optometry for the sake of excellent patient care and col-

laboration with other healthcare professionals.

Interprofessional behaviors have been defined as determining the best plan for patient care, demonstration of cultural competence, challenging the status quo when patient care is ineffective, involvement in team coordinated patient care, implementation of interprofessional teaching in chronic illness, and other collaborative behaviors to improve patient care.<sup>46</sup> These behaviors can be taught and reinforced through effective teaching methodology in clinical rotations.<sup>47</sup> The faculty and staff must understand and acknowledge the already adopted core competencies in order to implement and/or evaluate them.

Core competencies and maintenance competencies are tightly woven and have the potential of impacting optometric education institutions. The maintenance competency process has the potential of increasing the competition in optometric residency programs and may increase the need for more residency programs. Currently, optometric residencies are optional and are limited to 300 positions at 165 sites.<sup>48</sup>

## Conclusion

There are many benefits to establishing core competencies in optometry. The investment in competency-based education can facilitate the development of good citizens with democratic tendencies.<sup>35,49</sup> Education reform is an ongoing process and requires reassessment and readjustment of current policies and curriculums. Education reform also encourages the adoption of new perspectives to expand national development of our citizens and society.<sup>35</sup>

A core competency policy is important because it diminishes the silo effect that occurs within health professional schools. It also enhances collaboration and coordination of patient care that is important in quality healthcare delivery. Lastly, a core competency policy will better educate and prepare students for their futures.

## Acknowledgements

To Dr. Ben Williams for providing me with the inspiration to analyze optometric institutional history. To my colleagues, Dr. Robert Newcomb and

Dr. Aurora Denial; my father, Dr. J.R. Patel; and my husband, Scott, for volunteering to repeatedly proofread and offer input on this manuscript during preparation.

## References

1. Lucas C. American higher education: A history. Palgrave Macmillan, 2006.
2. Ehrenberg RG. Reaching for the brass ring: The US News & World Report rankings and competition. *The Review of Higher Education*, Winter 2002;26(2):145-162.
3. Haskins CH. The rise of universities. New Jersey: Transaction Publishers, 2007.
4. Gregg JR. The story of optometry. New York: The Ronald Press Company, 1965.
5. Banwell B. Optometry's flagship. *Journal of the American Optometric Association*. 1994;65(5):304.
6. Hirsch MJ, Wick R. The optometric profession. New York: Chilton Book Company, 1968.
7. The Klein School of Optics. *The Optical Journal*. March 1897;3(1):46-48.
8. Baldwin WR. The climate of change in education. *Optometric Weekly*. 1969;60(45):21-23.
9. Green R. The history of the Massachusetts College of Optometry. *Scope*. 1954;24(9-10):3-11.
10. Martin H. Opticians. *Keystone*. March 1892.
11. McFatrigh GW. Northern Illinois College of Ophthalmology & Otology. *The Optical Journal Supplement*. May 1899;5(5):131.
12. *Optometric World*. NICO and CCO Merge Under New Name, 1955;43(6):45.
13. Songe A. American universities and colleges: A dictionary of name changes. Scarecrow Press, 1978.
14. Goss DA. History of optometry. Unpublished manuscript, Indiana University, 2003.
15. Hirsch MJ, Weiner G. History of the American Journal of Optometry. *American Journal of Optometry*. 1968;45(1):43-57.

16. Geiger R. The ten generations of American higher education. In: P.G. Altbach, R.O. Berdhal, P.J. Gumpert (Eds). American higher education in the twenty first century. The Johns Hopkins University Press: Baltimore;1999:38-70.
17. Association of Schools and Colleges of Optometry. Affiliate Member Schools and Organizations. Available at: <http://opted.org/i4a/pages/index.cfm?pageid=3337>. Last accessed January 6, 2011.
18. Association of Schools and Colleges of Optometry. Member Schools and Organizations. Available at: <http://www.opted.org/i4a/pages/index.cfm?pageid=3336>. Last accessed January 6, 2011.
19. Association of Schools and College of Optometry Archived Publications. 1970, 1973, 1975, 1978, 1983, 1985, 1988, 1991, 1993, 1995, 1997, 2000, 2001, 2005, 2006 Annual Student Data Report: Applicants, Enrollment. Retrieved February 23, 2009 from ASCO Archived Publications.
20. Association of Schools and College of Optometry. 2008 Annual Student Data Report: Applicants, Enrollment, Graduates, Financial Aid. Available at: <http://opted.org/i4a/pages/index.cfm?pageid=3392>. Last accessed January 6, 2011.
21. Midwestern University - Arizona College of Optometry. Midwestern University Arizona College of Optometry Home Page. Available at: [http://www.midwestern.edu/Programs\\_and\\_Admission/AZ\\_Optomety.html](http://www.midwestern.edu/Programs_and_Admission/AZ_Optomety.html). Last accessed January 6, 2011.
22. Illinois College of Optometry, History. Available at: <http://www.ico.edu/aboutico/historyandmission.html>. Last accessed January 6, 2011.
23. New England College of Optometry. History of the College. Available at: <http://neco.edu/about-the-college/history.aspx>. Last accessed January 6, 2011.
24. Western University of Health Sciences. Western University Prospective Students Doctor of Optometry FAQs. Available at: <http://prospec>

- tive.westernu.edu/optometry/faqs. Last accessed January 6, 2011.
25. University of the Incarnate Word. School of Optometry. Available at: <http://optometry.uiw.edu/about/index.html>. Last accessed January 6, 2011.
  26. New England College of Optometry. Accelerated Doctor of Optometry Degree Program. Available at: [http://www.neco.edu/educational-programs/aodp\\_program.html](http://www.neco.edu/educational-programs/aodp_program.html). Last accessed January 6, 2011.
  27. The American Association of Medical Colleges. AAMC Member Schools. Available at: [http://services.aamc.org/memberlistings/index.cfm?fuseaction=home.search&search\\_type=M S & wildcard\\_criteria=&state\\_criteria=CNT%3AUSA&image=Search](http://services.aamc.org/memberlistings/index.cfm?fuseaction=home.search&search_type=M S & wildcard_criteria=&state_criteria=CNT%3AUSA&image=Search). Last accessed January 6, 2011.
  28. American Association of Colleges of Nursing. AACN Member Schools. Available at: <http://www.aacn.nche.edu/Memberservices/membdir.htm>. Last accessed January 6, 2011.
  29. Association of Colleges of Pharmacy. Pharmacy School Locator. Available at: <http://www.aacp.org/resources/student/Pages/SchoolLocator.aspx>. Last accessed January 6, 2011.
  30. The American Optometric Association. Mission and Vision. Available at: <http://www.aoa.org/x4874.xml>. Last accessed January 6, 2011.
  31. Hobbs F, Stoops N. U.S. Census Bureau, Census 2000 Special Reports, Series CENSR-4, Demographic Trends in the 20th Century, U.S. Government Printing Office, Washington, DC, 2002.
  32. de la Garza R, Moghadam SH. African American and Latino enrollment trends among medicine, law, business, and public affairs graduate programs. Tomas Rivera Policy Institute. University of Southern California, School of Policy, Planning, and Development, Ralph and Goldie Lewis Hall, 650 Childs Way Suite 102, Los Angeles, CA, 2008.
  33. Johnson DA, Austin DL, Thompson J. Role of state medical boards in continuing medical education. *Journal of Continuing Education in the Health Professions*. 2005;25(3):183-189.
  34. Organisation for Economic Co-operation and Development. The Definition and Selection of Key Competencies: An Executive Summary, 2005. Available at: <http://www.oecd.org/dataoecd/47/61/35070367.pdf>. Last Accessed on May 10, 2009.
  35. Moon Y. Education reform and competency-based education. *Asia Pacific Education Review*. 2007;8(2):337-341.
  36. Crabtree MK, Stanley J, Werner KE, Schmid E. Nurse practitioner primary care competencies in specialty areas: Adult, family, gerontological, pediatric, and women's health, April 2002. (DHHS Publication No. HRSA 00-0532[P]). Rockville, MD: Health Resources and Services Administration.
  37. Chandler DS, Chandler MD, Clark QC. The relationship between self-appraisal, professional training, and diversity awareness among forensic psychology students: A pilot formative evaluation. 2009. Academic Affairs, Argosy University-Dallas.
  38. Wong RM. Competency-based English teaching and learning: Investigating pre-service teachers of Chinese's learning experience. *Porta Linguarum*. 2008;9:179-198.
  39. Reimers F. "Global competency" is imperative for global success. *Chronicle of Higher Education*. 2009;55(21).
  40. Greenhill M, Metz C, Stander P. The case for a competence-based public administration curriculum for urban managers. *Innovative Higher Education*. 1982;7(1):27-43.
  41. Optometric education. Attributes of students graduating from schools and colleges of optometry: An Association of Schools and Colleges of Optometry report. 2000;26(1):15-19.
  42. Nahrwold DL. Continuing medical education reform for competency-based education and assessment. *Journal of Continuing Education in the Health Professions*. 2005;25(3):168-173.
  43. Friedman T. *The world is flat*. New York: Farrar, Straus, and Giroux, 2005.
  44. Clark PG. A typology of interdisciplinary education in gerontology and geriatrics: Are we really doing what we say we are? *Journal of Interprofessional Care*. 1993;7(3):217-228.
  45. Stern DT. *Measuring medical professionalism*. New York: Oxford University Press, 2006.
  46. Interprofessional Interprofessionalism. Wiki Site. FrontPage. Available at: <http://ippmg.pbworks.com/>. Last accessed May 16, 2009.
  47. Schuck S, Gordon S, Buchanan J. What are we missing here? Problematising wisdoms on teaching quality and professionalism in higher education. *Teaching in Higher Education*. 2008;13(5):537-547.
  48. Optometry Residency Matching Service, Inc. Available at: <http://www.optometryresident.org/>. Last accessed June 1, 2009.
  49. American Optometric Association. How value-driven health care is Changing the landscape. Available at: <http://www.aoa.org/x12522.xml>. Last accessed May 15, 2009.