

MSU EDA University Center for Regional Economic Innovation (REI)  
2012 Co-Learning Plan Series

# **Open Educational Resources:**

**Online Learning, OpenCourseWare, and Workforce Development**

**Steve Weiland, Ph.D.**  
Michigan State University

# Open Educational Resources: Online Learning, OpenCourseWare, and Workforce Development

Steven Weiland  
Michigan State University

Michigan State University  
Center for Regional Economic Innovation  
September 2012

## Contents

Introduction.....	3
1. Education and Work in the Digital Age.....	3
From the “Knowledge Society” to “Ubiquitous Learning” .....	4
The State We’re In .....	4
2. How Much Education is Enough?: From School to Work and Back .....	5
The Debate About Degrees .....	8
3. Why Open Educational Resources and OpenCourseWare? .....	9
The Success Story of Online Learning .....	9
The Two Domains of Open Educational Resources .....	10
4. Finding OpenCourseWare: First Steps and Questions of Credit .....	13
MOOCs and More.....	13
5. Self-directed Learning with OpenCourseWare.....	17
Skills, Self-Improvement, and Well-Being.....	19
6. What’s Ahead for OpenCourseWare? .....	20
Global Initiatives and Local Opportunities.....	20
Appendix.....	26
Appendix 1 .....	26
Appendix 2.....	28
Glossary .....	30
Works Cited .....	33

## Introduction

This report explores the role in workforce development of a new source of free and high quality postsecondary learning, and potentially perhaps of course credit, with an impact on credentialing--or “degree attainment”--for work and careers. It was only a decade ago that Open Educational Resources (OER) were first identified as essential to postsecondary education and lifelong learning in the digital age (UNESCO, 2002). Open Educational Resources names the vast array of free online resources for learning, including courses and course-based materials, textbooks, video and audio, multimedia applications, educational websites, reference works, games, simulations, self-assessments, and more (for instructive general accounts see Smith, 2009 and Sclater, 2011).

A comprehensive review of OER and education would display how they can have roles in many domains of life when people capitalize on the unending variety of free online resources for learning. The focus here is on OpenCourseWare (OCW), that formal category of OER with the potential to contribute to postsecondary degree attainment, a high priority nationally, and often identified as an urgent need for Michigan residents and the state economy. Some leaders in the OER movement believe that what has delayed recognition and use of OER is mainly that educational, government, and organizational leaders know little about them, what kind of learning they offer, and how they can become part of new patterns of postsecondary education—including having a place in workforce development.

The report’s first part sets the stage for attention to OER and OCW as part of the evolution of the “knowledge society” in the digital age. In the second part there is an account of the relations between postsecondary education, work, and careers in the context of the low rate of degree attainment in Michigan. The third part of the report explains the success of online learning in American postsecondary education and identifies OCW as a form of OER which can contribute to increasing degree attainment. Finding OCW is the subject of the fourth part, as is understanding how open online courses may be applied to two and four year degrees. Using OCW is the subject of the fifth part, specifically the nature of self directed learning, the essential condition for capitalizing on the new open courses. Finally, the sixth part of the report looks at what changes in institutional practices and policies can mean for the uses of OCW. With change so rapid its future can only now be estimated. But the urgency of improving degree attainment in Michigan makes greater knowledge of OCW necessary for any role it can have in building a better educated workforce suited to the conditions of our time and the decades ahead.

### 1. Education and Work in the Digital Age

There are few forms of work that don’t require some education. And fewer still that don’t depend on lifelong learning at the workplace and beyond for career success. With the extraordinary expansion of postsecondary education in the second half of the 20<sup>th</sup> century the United States grew economically, demonstrating that the relations between learning and work were direct, and beneficial for individuals and society. Still, until recently the success of manufacturing in Michigan sheltered many residents from what Americans in other states and regions have recognized about learning and degree attainment.

## From the “Knowledge Society” to “Ubiquitous Learning”

Accounts of our recent past and prospects for the future attentive to the nature of work and careers rarely ignore what it means to live in a “knowledge society.” The phrase was introduced by the influential economist and management theorist Peter Drucker (1969) who studied the pace and direction of change in the late 20<sup>th</sup> and early 21<sup>st</sup> centuries. Even if the phrase is sometimes overused as a slogan in public life, it signifies an essential condition of modern work. Thus, learning—advancing our knowledge and skills—is essential to career development and economic growth. And Drucker insisted that participation in the “knowledge society” meant “learning how to learn,” plainly the cornerstone of a lifelong approach to education and a productive workforce.

The impact of Drucker’s work has been lasting even if he had only a few years—he died in 2005—to apply its lessons to the rapid growth of the Internet, advances in hardware and software (as in mobile devices), and the unending expansion of online educational resources and opportunities. Thus, the task of our time is to understand what learning is coming to mean when it reflects the conditions of the digital age. For example, a group at the University of Illinois has named our time one of “ubiquitous learning.” They say: “The process of learning and the products of learning are rapidly merging into ubiquitous knowledge engagement. The implications of this profound transformation—for formal schooling, for online communities, for evolving definitions of public knowledge, and for global interconnectedness and economic development—cannot be underestimated “ (Cope and Kalantzis, 2009).

Of course, there are reasons to be wary of what has been called “digital maximalism,” with what it can mean for living with constant connectivity, and the projections of techno-utopians, who see only the gains in innovation and none of what can be lost, as in the impact of multi-tasking on habits of attention (Powers, 2010). But there is no doubting what technology can supply to adults seeking to make the most of education for work. Thus, in a world of “ubiquitous learning” postsecondary education is no longer bound by space, with the campus being its only location.

Equally important for working adults, however, is what “ubiquity” signifies for educational time, now customizable online with opportunities for integrating self-directed learning into the routines of work and life. Nicholas Burbules, who leads the Ubiquitous Learning project, identifies what is new: “Lifelong learning means that learning is not relegated to a certain age or time, a certain institutional setting, and a set of externally oriented motivational structures. Rather, in this changed world view, *to be is to learn.*” Of course, “ubiquitous learning” includes the value of experience. But in its formulation of the advantages of technology it also offers new formats for “structured intentional learning opportunities” (Burbules, 2009).

## The State We’re In

As recent reports reveal, the “knowledge society” and the conditions of “ubiquitous learning” are being realized at a slow pace in Michigan (Glaser and Grimes, 2011; Good, 2012). Paradoxically, while the state’s colleges and universities are admired as some of the best in the nation and the world, Michigan lags behind most other states in the rate at which its own residents complete two and four year degrees. Only 32% of Michigan residents hold such

credentials. The state ranks 36<sup>th</sup> in the nation in this educational category, with unwelcome consequences for job growth, and for individual and economic development.

At the same time, authoritative recent research demonstrates the relation between postsecondary education, employment, and satisfying careers, or the “College Payoff” as explained in Part 2. Thus, “degree attainment”—in the phrase of postsecondary education and economic policy analysts—is properly perceived as essential to Michigan’s workforce development and its prospects for prosperity. According to Larry Good (2012) of the Ann Arbor-based Corporation for a Skilled Workforce, “Michigan’s most urgent workforce need in a new generation workforce policy is to increase attainment of post-secondary degrees and other credentials.”

### **The Priority of Formal Learning**

Drucker was an independent and forward looking thinker. But, perhaps surprisingly, he had a traditional view of how adults should go about strengthening their prospects in life and work: “An educated person will be somebody who has learned how to learn, and continues learning, especially by formal education, throughout his or her lifetime” (Drucker, 2001) By “formal education” Drucker meant systematic study under the guidance of an expert teacher, and with institutional recognition of successful results in the form of academic credits and a degree.

Still, in a late life (2001) account of the “knowledge society,” Drucker’s optimism got the better of him when he claimed “upward mobility [would be] available to everyone through easily acquired formal education.” He spoke from the perspective of someone who had seen the American system of postsecondary education expand, increasing opportunity and moderating costs with sustained public financial support. As is well known, “easily acquired formal education” is now problematic for many Americans, including residents of Michigan where state expenditures on higher education have declined considerably and tuition costs have risen. Application rates to public and most private colleges and universities are stable or rising, signifying demand by the cohort of traditional-age college students. But for non-traditional students, those beyond high school, with jobs but limited career prospects, time and cost belie the ideal of formal education “easy” to acquire.

Open educational resources, particularly in the form of OpenCourseWare, promise a new form of access to postsecondary learning. And with initiatives now underway by leading American universities, OCW can have an unexpected role in how people earn academic credit and move toward two and four year degrees.

## **2. How Much Education is Enough?: From School to Work and Back**

Is there anything told to students more often today than that they must become “lifelong learners”? For example, the influential *Partnership for 21<sup>st</sup> Century Skills*—an organization representing major corporations--specified that “Learning Skills” themselves were as important as the curriculum in reforming education. “As much as students need knowledge in core subjects, they also need to know how to *keep learning* continually throughout their lives.” For corporations, as potential employers, there are good reasons for encouraging lifelong learning. And for many people lifelong learning—the pursuit of information, knowledge, and skills--is also a resource for growth and pleasure outside work.

Learning is understood by all sectors of society to be an essential feature of human development, as represented chiefly in the U.S. by historical investments in K-12 education since early in the 19<sup>th</sup> century. And in the post WWII decades college enrollment grew steadily, supported by the rapid expansion of public higher education in the states (Thelin, 2011). By the end of the twentieth century, as Drucker’s assumptions reveal, a college degree was virtually a requirement for a well paying job and for prospects of career advancement.

But how much formal education is enough? That is a question being asked today, prompted by the uncertain job market (itself a consequence of the “Great Recession” that began in 2008) and by the high cost of postsecondary education and the rate of student debt considered in the context of weak prospects for employment among many degree holders. And, with the rapid expansion of technology, how will new sources of learning—some originating in the traditional postsecondary system--be matched to the interests and needs of adults, and with what new opportunities for gaining credentials useful in the workplace? OER and OCW should be seen against the backdrop of current inquiry and opinion about relations between learning and work.

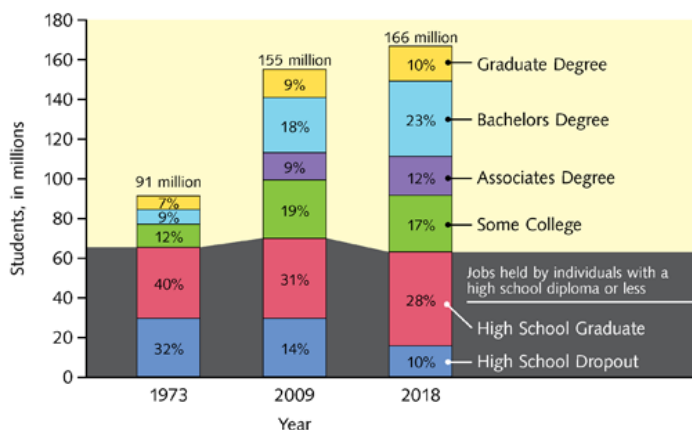
### **“The College Payoff”**

While preparation for work is not the only reason for public support of education—from kindergarten through college—it has been the one that has most recently claimed attention. That is because education is seen as one solution for the problems we face in unemployment and underemployment. Prospects for careers are uncertain and the history of the relations between education, employment opportunity, and lifetime earnings stand behind current claims for learning’s role in success at work.

A widely cited 2011 study by Georgetown University’s *Center on Education and the Workforce* gave a name to the impact of undergraduate degree completion and career success: “The College Payoff.” The study focuses on the “premium” that comes from having a bachelors degree, or how much more a degree holder earns over a life time than a high school graduate. It has grown to 84 per cent since 1999. Thus, over a lifetime, a four year degree is worth, on average in 2009 dollars, \$2.3 million in earnings compared with the \$1.3 million likely to be earned by someone with only a high school diploma or the \$1.5 million someone with some postsecondary education but no degree can expect. A two year (associates) degree is likely to bring \$1.7 million over a working life. Of course, other variables—like gender, race, age, and location--also contribute to earning power, career advancement, and job satisfaction. But the impact of degree attainment is plain. As the *Center* puts it: “No matter how you cut it, more education pays” (Carnevale et al, 2011). And, a new *Center* report (August 2012) demonstrates the “advantage” in the economic recovery to degree holders. In fact the report underlines that “employment growth since 1989 has been entirely driven by workers with education beyond high school” (Carnevale, et al, 2012).

And a 2010 Georgetown Center forecast (Figure 1) projects that degrees will only play larger roles in employment prospects in the years ahead, extending the trend of recent decades.

Figure 1. Higher Attainment Levels Needed for Future U.S. Jobs



Sources: U.S. Census Bureau, CPS, 1973, 2009; Anthony Carnevale, *Help Wanted* (June 2010): 14.

A 2012 study of recent high school graduates from 2006 to 2011 conducted by the *Heldrich Center for Workforce Development* at Rutgers University confirms the point. And another 2012 study, by the McKinsey Global Institute, identifies the trend as a global one. Indeed, McKinsey projects that worldwide there will be a shortage of adults with postsecondary credentials for available work (Dobbs, et al, 2012).

There are jobs for those with only high school diplomas. But the most rewarding forms of work require more--completing a degree program at a two or four year institution in the years just after high school, or earning a degree later in life, typically as a part-time student while employed. The limits of having only a high school education are revealed in another way by the Rutgers survey. Less than a quarter of the high school graduates said that they were satisfied with the opportunities for more education and training in the jobs they held (Van Horn et al, 2012). For this group, opportunities for more satisfying work and career development will often depend on what job holders and job seekers can do for themselves in gaining knowledge and strengthening their skills. OCW is a step in this direction, with what it can contribute to degree attainment.

The Georgetown and Rutgers studies focus on the benefits of education to individuals. But degree attainment is also understood to be crucial to state and regional development. In fact, it is common today to hear that “education is economic development.” In Michigan in particular, the gap between educational attainment and career and economic opportunities is said to be the primary obstacle to a statewide recovery from the recession of the past decade. A recent report based on national and local demographic trends finds that Michigan will be a “low prosperity state” without a significant increase in degree attainment (Glaser and Grimes, 2011).

Until recently Open Educational Resources and OpenCourseWare were generally seen as complementary to the degree granting system. They can still be seen as such. But, as explained below (in Part 4), it appears that OCW will present unexpected but welcome opportunities for degree seeking independent learners.



## The Debate About Degrees

Still, the case for degree attainment has its critics, many reflecting uneasiness about the well publicized initiatives of the College Board, the Lumina Foundation, and the Obama Administration, which themselves reflect uneasiness about the competitive position of the U.S. in the world. Thus, Lumina's well publicized project "Goal 2025" promotes increasing the proportion of Americans with "high quality degrees and credentials" to 60% by the year 2025.

Some observers warn of a higher education "bubble" that will demonstrate, as in the case of the housing market a few years ago, that the value of a college degree is being wildly inflated and thus the entire system requires a major adjustment in expectations and costs (Reynolds, 2012). The disagreement can be seen in a May 2012 exchange about education and work between *Washington Post* columnist Robert Samuelson and William Kirwan, Chancellor of the University of Maryland System.

Samuelson proclaimed that "It's time to drop the college-for-all crusade." He believes that our "obsessive faith in college" has produced a system with too many unqualified students and too many of them with sizeable debts. Samuelson says that we are turning out enough college graduates already since most jobs (he cites a US Labor department estimate of 69 per cent) don't require formal education past high school: retail sales workers, truck drivers, waiters and waitresses, among others. "For these students," Samuelson says, "the crying need is for high school to give them a solid foundation in basic knowledge and skills." He cites recent academic studies showing the advantages of the European systems of vocational education and apprenticeship as better routes to improving employability and offering paths to career success. In recent years a similar position has been argued by the social critic Charles Murray (2008).

Kirwan protests that "college for all" is an inaccurate way to name current attention to "degree attainment" for those who enroll in degree granting programs. No one, he asserts, is saying that everyone must have a four year, or even a two year degree. Then he cites economic forecasts for his state, consistent with Figure 1 above, which say that by 2020 Maryland will not have enough college educated adults to fill the jobs requiring postsecondary learning. At present, he notes, only 44% of Maryland adults ages 25-64 have a postsecondary degree. Again, in Michigan the figure is 32%. For Kirwan, as for observers in Michigan, the "college payoff" is critical to individuals, and to states and regions.

So, we can see the difference in views: There are those who still believe that a high school education is enough for the majority of the population and for a productive workforce. And there are those convinced that postsecondary credentials are essential if individuals are to succeed and society prosper in the next economy. Anthony Carnevale, who directs Georgetown's Center, understands the attraction to some of the idea of a higher education "bubble," particularly during a period of economic uncertainty. But he believes, again, in the "college advantage" and that the current recession is in fact a reason to pursue postsecondary learning: "Higher education is still the best umbrella under which to wait out a storm, no matter how long the current one lasts."

As is often noted, Michigan's history and culture prompts lingering affiliation with the "high school is enough" view of education and work. But if that reflects in part the obstacles to degree attainment then the opportunities for learning in the digital age—including OpenCourseWare--may contribute to what Michigan residents have to "unlearn" about traditional postsecondary education.

## Work and Education in the "Middle"

The debate about degrees—in its polarization of the options in determining how much education is enough—can also obscure what recent research has shown about the prospects of people with “middle skills.” They hold jobs that require more than a high school diploma but less than a four-year degree. According to a 2009 study such jobs represent more than half of those in Michigan and will continue to do so in the future (The Workforce Alliance, 2009; see also Holzer and Lerman, 2007). The study makes a key point about adult learning: “Sixty-four per cent of the people who will be in Michigan’s workforce in the year 2020 were already working adults in 2005—long past the traditional high school-to-college pipeline.”

Certificates, reflecting mastery of skills expected by employers in the local economy, are gaining in popularity as one path to credentialing beyond high school. And new competency-based approaches to higher education, leading to a degree, seek to undo traditional reliance on courses and the conventional semester calendar, now seen by some critics as benefiting institutions more than students. But such degree programs, appealing as they can be to experienced working adults with “middle-skills” (and others) are now very limited, the innovative Western Governors University being the best known example (Mendenhall, 2012).

If credentialing is a goal of study with OER then the appeal of OpenCourseWare is plain in matters of accessibility and cost (free being the best price). OER and OCW can, of course, fortify skills and personal development apart from the pursuit of a two or four year degree. But those with only high school diplomas, or perhaps with some postsecondary education, can also consider OCW as a path to opportunities at community colleges, often the best choice for working adults where online degree programs are available. In Michigan there are 32 online associates degree programs at community colleges, but only a quarter of the institutions offer them and half are offered by one (Lansing Community College). A role for OCW in certificate programs, highly specialized by industry as they typically are, is unlikely.

The report on “middle skills” in Michigan says of the state’s workforce and economy that both face “seismic change.” So too, according to some observers, does postsecondary education, even if there are not yet signs of it among Michigan colleges and universities. OER may be said to be education “in the middle”—between high school (and some college) and enrollment in a degree program, ideally with academic credit for success with OpenCourseWare.

### **3. Why Open Educational Resources and OpenCourseWare?**

Open educational resources reflect the worldwide digital revolution, including increasing access to the Internet via broadband technology. They are part of digitally inspired developments in education initially recognized by UNESCO and other global agencies, and the Hewlett Foundation in the US, in recognition of the possibilities in individual but networked learning (Walsh [2010] explains the large role of the foundation in the development of Open Educational Resources and OpenCourseWare).

#### **The Success Story of Online Learning**

OER are already woven into everyday Internet use. Thus, millions of Americans each day consult *Wikipedia* and other online reference works, do research on questions of personal health and financial management, pursue knowledge in traditional academic fields like history and psychology, and cultivate interests like cooking and knitting. While our institutions of higher education are centuries old, the Internet is outpacing them in access and range in the many locations it offers for learning. Despite their popularity, social media sites (like Facebook and Twitter) lag behind the uses of the Internet for finding information (as reported in 2012 by the authoritative Pew Project on the Internet and American Life). Of course, “information” is a broad category and not all of it can be claimed to be educational. But it is safe to say that for most Americans Internet use is seen as an increasingly natural medium for learning.

And online learning is now fully institutionalized in American postsecondary education. According to the latest version of an authoritative annual national survey, 31% percent of all American postsecondary students are enrolled in at least one online course. A sizeable number are enrolled in for-profit colleges but it is mistake to identify postsecondary online learning with this sector in which, in fact, online study is steady or decreasing while it continues to increase at traditional institutions if not at the rate it has showed in the past decade (Allen and Seaman, 2012a). And if we include the recent surge in participation in open courses offered by leading universities—not counted because the students (with many outside the U.S.) are not enrolled in degree programs—then the universal appeal of online learning is even more apparent.

As this report recognizes, OER represent more than college courses (see Appendix 1). But the growing popularity of online course work must be seen for what it contributes to general public views of online learning. And major recent studies comparing online and face-to-face learning in college courses found no significant differences between the two, and in fact, in many cases online learning accounted for better results (e.g., Means, et al, 2010). True enough, there is still skepticism among faculty members at colleges and universities about online teaching and learning but “fear” about it often reflects lack of experience with the format (Edmundson, 2012; Allen and Seaman, 2012b). In the matter of courses, adults with little or no postsecondary experience, or who have been out of school for some years, can be assured that online learning is widely seen as a worthy complement (or more) to the traditional instructional format.

The promise of open educational resources plainly lies in access and cost. In recent decades online learning has replaced a good deal of traditional “distance education” in the face-to-face format making postsecondary education available to adult learners beyond the primary campus. But access, in the model of the extended physical campus, was still limited by the need for students to participate according to institutional schedules. The new for-profit institutions—like the University of Phoenix—devised new models for course structure by breaking up the familiar semester and instead scheduling to provide many convenient enrollment opportunities. But for-profit courses and degrees can cost as much as they do at highly regarded traditional non-profit colleges and universities. OpenCourseWare offers the advantages of freedom in space and time for learning, often in courses from leading universities, and low (or no) cost.

## **The Two Domains of Open Educational Resources**

Open Educational Resources can be fitted to a host of educational goals, many career-related while others serve non-work interests. All reflect the ubiquity of digital experience and the range of adult interest and aspirations for knowledge and skill, in addition to what can be found on the Internet in information and entertainment. Appendix 1 describes OER in this first

domain, as “unschooled” educational resources unrelated to formal college-level courses. But the “college payoff” (or “advantage”) and degree attainment remain powerful forces in our society, shaping student and family plans and hopes, and the expectations of employers. Thus, this report focuses on the second domain of OER, OpenCourseWare.

OpenCourseWare (OCW) refers to: 1) Complete courses available online at no cost in different formats (e.g., from a syllabus and print materials to full video and audio representations of lectures with other content and learning assessments); and 2) Resources available for instructor use in the design and offering of such courses, although individual learners too can use such resources. OCW is free and openly licensed (often via the new popular formats for copyright devised by Creative Commons), accessible to anyone at any time via the internet. Today, OCW represents what can be called the “branded” or institutional approach to OER. Thus, the quality of the resources can be seen as a function of who is offering them, now some of the nation’s leading institutions (as described in Part 4). Proponents of OCW believe that such courses not only solve problems of access and cost but represent innovative digital teaching, adding to the appeal of online learning.

At their best, OER in the form of well produced college-level courses (or OCW) amounts to a global effort at educational preservation. Based as they are on courses designed for classrooms, the materials and activities that go into traditional degree-based course work have been understood as local only, available to enrolled students in face-to-face classes. Needless to say, an online course is not the same as one conducted in a classroom, with traditional interaction among students and the instructor. But innovative OCW projects—even ones with thousands of enrollments in individual classes—promise unexpected opportunities for formal education. The development and use of OCW has increased considerably in the U.S. in the past year and advocates foresee continuing expansion now with the participation as providers of leading American universities, and the early success of the “Massive Open Online Course”—some with tens of thousands of students (Weissman, 2012).

For its advocates, OCW is a timely and durable solution to fundamental problems of access and equity in postsecondary learning (Kamenetz, 2010, 2012). And, with further development of OCW and its role in the degrees granted by accredited colleges and universities, self-directed online learning by adults in a national and even global system of high quality college level courses can have a place in degree attainment. But some observers, while supportive of OER and OCW, urge caution, mindful of the uncertain status of OCW in the context of the current degree granting system. What will be the place of OCW in programs credentialing people for work and other activities? Can credit for course-based OCW be integrated into degree programs? How will credit assessment work and with what costs? And: To what degree will postsecondary institutions and organizations collaborate in offering and promoting networked opportunities and degree completion services to OCW students?

## **What OER and OCW Can and Can’t Do**

Open Educational Resources and OpenCourseWare offer opportunities for learning in virtually any subject and practice. For motivated and self-directed learners they provide ways to increase knowledge and improve skills at a pace they determine for themselves, to explore new forms of work and what is required in knowledge and skills (or “competencies”) by them, and to gain experience in e-learning, an essential feature of occupational success in the years ahead.

Success with OCW (and other forms of OER) can also be a source of confidence in the

ability to seek out the necessary resources for earning a degree. Psychologists have named “self-efficacy” as an essential feature of cognitive and behavioral maturity. Self-efficacy refers to the personal beliefs individuals have that they are capable of learning and particular behaviors (Bandura, 1997). Students’ perceptions of self-efficacy have been found to influence their decisions about the choice of activity in which they engage, their emotional responses (e.g., stress and pleasure) when doing what is necessary for learning, and their persistence in carrying out educational tasks. And self-efficacy in learning in our time can be seen in the context of a new ability called “digital literacy.” This form self-efficacy means being able to work effectively with the tools of the new communications and information technologies (e.g., using search engines, reading online texts with hyperlinks, mastering asynchronous formal learning, and more). The Internet scholar Howard Rheingold (2012) names this as being “Net Smart.”

How successful have learners been with OpenCourseWare? Estimates today reflect largely the expectations of those leading the movement and supplying courseware and other resources, including UNESCO, the Commonwealth of Learning, and prestigious institutions like MIT and Stanford. Judging from the number of uses of the most popular sites and the testimony of users (e.g., at MIT’s OpenCourseWare project) there are reasons to believe the claims made for the impact of OER on individual learners. What we don’t know as yet is how their uses have influenced workplace effectiveness and career development, or how OER and OCW can be part of a systematic effort by government and non-profit organizations to build a better educated and equipped workforce.

There are plain limits to OpenCourseWare. There is first the problem of access itself. Availability does not guarantee ready findability. Unlike a conventional curriculum designed to be the basis of degree-based study, OCW offers free standing opportunities for learning. While there are efforts underway to classify and present OCW in ways that capitalize on their accessibility, there is no comprehensive or systematic way for adult learners to estimate their uses (Forward, 2012).

A second limit on the impact of OCW today is its uncertain relation to formal credentials. The lack of institutional recognition was named as the primary disincentive in a 2009 study of OpenCourseWare users in Utah whose schools and universities have pioneered in online learning (Arendt and Shelton, 2009). As explained below (in Part 4) there are efforts underway to formulate OCW-based pathways to formal recognition of learning. The Utah study also found a third limit, for some students, in a lack of direct contact with course instructors, reflecting the design of OCW as resources aimed at self-directed learning (as discussed in Part 5).

So, while OCW can make people better at what they do—and lead them toward new knowledge and skills—their impact cannot easily be represented in the forms employers have traditionally valued. E-learning advocates of postsecondary educational reform anticipate that the system will soon respond to what OCW offers and what many adult learners want in credentials. But until individuals capitalize on opportunities for credit for successful performance with OCW (likely via forms of “Prior Learning Assessment” as in Part 4) and institutions present themselves as welcoming such credit, what OCW can do is limited to what individuals themselves make of them and what can be demonstrated in knowledge and skill apart from what might be recognized for purposes of degree attainment.

Colleges and universities are often said to be the slowest to change among American institutions. But there are already signs that some at least are preparing to adapt to the possibilities for learning with OCW—either as providers or as institutions ready to participate in new forms of academic recognition and credentialing. OCW presents an opportunity for

economic development agencies and organizations to have roles in the redefinition of postsecondary learning for non-traditional adult learners. What OpenCourseWare can't do today should not be an impediment to anticipating what it will likely do in the near future.

#### **4. Finding OpenCourseWare: First Steps and Questions of Credit**

OpenCourseWare may be “open” but that doesn't guarantee it is visible to all potential users eager to find resources matching their interests and needs, and to estimate their functionality and potential. The exponential growth of information on the Internet, and the many online locations of OCW, mean that finding particular courses is not as simple, say, as locating well known colleges and universities. As explained above, Open Educational Resources can be classified in general terms in two domains. What follows is a brief account of current providers and aggregators of OpenCourseWare (the other category of OER, largely unrelated to degree attainment, is represented in Appendix 1).

An “open” course is fully accessible to anyone, at any time, from any place. But access is more than a matter of connectivity. The newest providers of OCW take pains to make their sites “user friendly” in the sense that it is easy to see what is offered, with what expectations, and with what uses of digital technology. Enrollment is simple, and students themselves can choose to participate in ways they find satisfying. The courses are generally polished ones from a technical perspective, and more and more of them feature highly regarded university scholars and scientists also well known for their teaching. Until recently, OCW featured science and technology as subjects but that is also changing, as leading universities offer courses in history, sociology, literature, and other fields of the social sciences and humanities.

#### **MOOCs and More**

- The OpenCourseWare Consortium is the foremost aggregator of OCW, with over 250 universities and associated organizations world-wide contributing materials from more than 13,000 courses (in many languages). There are thousands of courses in English, many from the institutional sites named below. The extensive listing allows for a broad view of what is available. As in the case of the famed MIT OpenCourseWare Project (as below) a “full course” can be a syllabus and access to learning materials, or a video or audio record of the activity of the classroom, or some configuration of print and multi-media. The OCW Consortium also includes courses from for-profit universities, these often being designed as inducements (via the offer of credit) to enroll in their degree granting programs. AcademicEarth.com is another aggregator featuring mainly courses from institutional OCW sites.
- The Massachusetts Institute of Technology's OpenCourseWare Project (OCW) first brought attention to the course-based part of the OER movement and has been instrumental since 2002 in legitimizing this format for learning. Almost 2,000 courses are available from MIT OCW, most in science and technology, but there are many too in other fields of the undergraduate curriculum. MIT is extending its OCW project (with MITx) in the direction of more interactive components and, potentially, forms of recognition. And MIT is also now a partner with Harvard University and the University of California at Berkeley in edX which will offer courses beginning in fall 2012.

- Yale University's OpenYale, Carnegie Mellon University's Online Learning Initiative, and the LearningSpace at Britain's Open University are other major institutional OCW projects. OpenYale may be said to be the opposite of MIT OpenCourseWare in its focus on courses in the humanities, arts, and social sciences. The 25 courses, all based on polished lectures, are designed to offer something akin to being in an actual Yale classroom. They are in a consistent video format featuring many of Yale's most highly regarded teachers. Carnegie Mellon offers courses with no visible instructors. Instead the focus is on intricately designed but still accessible textual and graphical explanation. An important innovation is Carnegie Mellon's ambitious system of automated assessment (via a "Digital Tutor") that is constructed to respond to student error in ways that advances learning. Like MIT, CMU specializes in its 13 courses in the sciences (all very expensive to design and produce) and these have found sizeable audiences at community colleges where local faculty incorporate them into the credit curriculum. CMU is now also experimenting with an introductory course in French. All courses, like Yale's, are open to anyone. LearningSpace at the Open University includes OCW in many subjects, some in the form of full length courses, but many in briefer formats, or what LearningSpace calls "units."

- Coursera and Udacity are private for-profit OCW organizations begun in 2012. Both derive from the success of Stanford University with Massive Open Online Courses (or MOOCs) as they are now called (Lewin, 2012). Enrollment can reach more than 100,000 in such courses, although early experience shows that only perhaps 20% of the students will complete them—still an impressive number. Coursera is a joint project with courses—all free--in many fields of the curriculum from Stanford, the University of Pennsylvania, Princeton University, the University of Michigan, and eleven more institutions of similar stature (with two in Europe). All courses are taught by experienced and highly regarded faculty. Udacity, unaffiliated with any postsecondary institution, offers many fewer courses—all in computer science and related fields—with similar faculty participation. Coursera and Udacity intend to make their courses locations for pedagogical innovation with technology, with automated assessments and knowledge of learning that can come from data on student performance. And both plan on developing systems for recognizing students' achievements, an important claim to be made for OCW as sources of college credit. What kind of business model do these organizations follow if the courses are free? Both are supported now by venture capitalists who anticipate that in the future OCW can be revenue producing, perhaps with "premium services" and advertising. But the investments signify optimism about the global appeal of OpenCourseWare, including the prospects for developing a system of formal recognition beyond the awarding of course completion certificates by instructors, as is the case in the first round of Coursera and Udacity offerings (spring and summer 2012).

- iTunesU and YouTube.edu are online locations many institutions and individuals use to offer open courses. Many are the same as those available at institutional websites (like MIT's OpenCourseWare). An advantage in using iTunesU and YouTube.edu functioning as aggregators is that it makes OCW "shopping" (if you will) easier, with offerings side-by-side. Coursera and Udacity have had considerable media recognition. But many valuable complete online courses appear on iTunesU and YouTube.edu, some in channels dedicated to esteemed postsecondary universities. YouTube also includes thousands of brief educational videos—lectures, commentaries, demonstrations, etc.-- outside the framework of a complete course (like the thousands posted by the now famous Khan Academy, as recognized in Appendix 1).

- Udemy is another for-profit educational “start-up” offering free online courses. It relies on the motto “Learn Anything, Teach Anything.” Thus, there are thousands of courses, some taught by well known scholars and scientists at colleges and universities, others offered by less experienced but often equally enthusiastic teachers. The courses can vary significantly in length and expectations. Udemy lies between the “unschooled” Open Educational Resources described in Appendix 1 and the formal offerings from well established institutions found at Coursera and Udacity.
- Saylor.org is a project of the Saylor Foundation’s “Free Education Initiative,” supported since 2008 by a successful businessman who believes that the educational future is in independent course-based online learning. The staff at saylor.org, with advice from faculty advisors around the country, builds its free courses in many fields from "open access" online resources. There is recognition for completing courses but--as of now--no degree. Saylor represents a fundamental principle of OCW, as the foundation puts it: “We expect free, self-paced, automated online learning opportunities to motivate people to pursue personal growth and career ambitions as well as to lead to institutional change among education providers everywhere.” There is now a partnership between the Saylor Foundation and StraighterLine (an organization offering low cost online courses) aimed at establishing procedures to convert the recognition into usable college credits with StraighterLine’s academic partners—small regional colleges and universities. This is a path to conventional credentialing that is, in the second half of 2012, becoming a topic of considerable interest (as below).
- OpenStudy doesn’t offer its own courses but is a popular new tool allowing students working on OCW to study together—posing and responding to questions about course content in real time. The software is aimed particularly at learners in the new MOOCS. OpenStudy already has formal relationships with some of the leading providers of OCW (like MIT). It represents the view in the OER movement generally that even self-directed learning is a social activity, benefitting from what students can teach one another.

## **Experiences, Courses, and Credit**

There are some observers of online learning who favor its role in what they see as a looming American rejection of traditional schooling, and even of formal education altogether. Thus, two experienced scholars of public education recently said this: "As older generations continue to impose established methods of learning in school, technologies will leech critical learning resources, such as student motivation, attention, and resources, out of the education system. Trying to reassert the identification of schooling and learning will be a losing battle" (Collins and Halverson, 2009). In this view, the future of education is in new configurations of learning shaped by what technology can do to meet individual learner preferences.

But the advent of OCW has in fact prompted movement in the opposite direction, confirming American (and global) dedication to formal credentialing by educational institutions. As this report has already suggested, perhaps the most urgent question to be addressed in the OpenCourseWare sector of the OER movement is the availability of credit for satisfactory completion of free online courses which can be applied to degree attainment. Until OCW providers themselves agree to move beyond “recognition” (typically in the form of a do-it-



yourself certificate issued by university faculty serving as OCW professors) students can turn to alternative paths to postsecondary credit.

There are already in place well established services for the assessment of learning outside the traditional system. To be sure, there has always been in postsecondary education skepticism of “credit for life experience.” But the services insist that they focus on rigorous documentation and demonstration of learning, commonly called “Prior Learning Assessment” (PLA) to signify that academic credit is to be applied as a student readies for entry or reentry into a two or four year degree program (see Kamenetz, 2011; Fain, 2012a, 2012b).<sup>1</sup>

- The American Council on Education (ACE) represents 1,600 colleges and universities and manages a Credit Recommendation Service reflecting evaluation of workplace and military training, and other forms of structured educational experience. Its new Center for Lifelong Learning is likely to play a role in the development of Prior Learning Assessment of student experience with OCW.
- The College Board offers the College Level Examination Program (CLEP) with tests in 33 subjects. Preparation for such tests in the form of participation in OCW courses is a new path to earning college credit. Testing for college credit, with the same opportunities for preparation via OCW, is also available—for military personnel, veterans, and civilians—from the Defense Activity for Non-Traditional Education Support (DANTES).
- At UExcel, a newer service, learners can take exams in seven essential categories at testing centers across the country managed by the major educational publisher Pearson. Again, OCW is now or will certainly soon be available in all categories of UExcel testing. As in the case of CLEP, the tests assess knowledge and ability in an academic subject. As OCW experience grows, adult independent learners will discover the best uses of them in test preparation.
- Rather than tests, the Council for Adult and Experiential Learning (CAEL) specializes in Prior Learning Assessment based on student portfolios reflecting accomplishments meriting academic credit. CAEL’s new LearningCounts initiative offers a program to guide adult learners in the preparation of a portfolio demonstrating prior learning from different sources, including OCW. Thus far LearningCounts has only a fraction of the postsecondary partnerships--for accepting LearningCounts assessments and credit recommendations—of the ACE or the College Board (less than 200 of the nation’s 4,000 plus colleges and universities) but it is growing. At present only one Michigan postsecondary institution, Lansing Community College, has joined the project. A key feature of CAEL’s own recent research is the finding that students who gain academic credit via Prior Learning Assessment--often working adults--have higher rates of degree completion than do students who enter postsecondary education in traditional fashion.

OpenCourseWare presents a significant new use of external assessments. Thus, a student who has completed one or more open online course (typically a MOOC) can demonstrate

---

<sup>1</sup> Throughout this report the focus is on academic credit. Some advocates for recognition of OER and OCW also endorse the value of the “badges” now being promoted by a project of the Mozilla Foundation (see Knight and Casilli, 2012).

learning via a test or the presentation of a portfolio. Both paths require motivation, planning, and persistence equal to what it takes to succeed in an open online course, in effect similar to the habits of self-directed learning outlined in Part 5 of this report.<sup>2</sup>

## 5. Self-directed Learning with OpenCourseWare

Access is the cornerstone of the OCW movement. Never before have so many college-level resources for learning been accessible at no cost to more people. But of course simply because resources are accessible doesn't guarantee they will be used. And "use" can be variously defined in terms of any learner's needs, expectations, and preparation—and then however what is learned is applied and evaluated. Thus, the effectiveness of OCW depends on what users bring to them, or how "self-directed" they can be in using resources that require considerable autonomy and motivation.

Given how much formal learning takes place in schools and other educational institutions, where being a student means taking instruction and direction from others, we might think that self-directed learning (SDL) is only a marginal enterprise. But if we look broadly at what adults do it is easy to see that most learning is done in this manner. No adult learner is without experience in self-directed learning. Even the most traditional of classrooms requires a student to "direct" himself or herself in some fashion, however minimally, in order to complete a lesson or a course.

Self-directed learning can be as important to long-term individual development as what happens in conventional classrooms. And, indeed, we can even find SDL in schools and colleges, as teachers seek to guide their students—even the youngest of them—toward suitable independence, often, as noted above, according to increasing attention to the value of becoming a lifelong learner. After all, that image is not meant to suggest a lifetime in the classroom. But the rapid growth of the Internet and of OCW have given new meaning to what is possible for lifelong learners. In any case, whatever the form of learning, individual or in groups, a foundation of self-direction is essential.

### Responsibility, Readiness, and Drive

Self-directed learning has long been a subject of interest to scholars in education who have focused on these primary questions: Does self-directed learning refer primarily to the process or means a person chooses for learning or to the individual characteristics from which the preferred process derives and the personal development likely to be the result of such an activity? Is self-

---

<sup>2</sup> Western Governors University is a new and innovative institution offering prior learning assessment based on "competencies" rather than completion of conventional courses, traditional or online (Mendenhall, 2012). So too does the new "flexible degree" program announced in June 2012 by the University of Wisconsin System (see Chen, 2012). A recent report from the Center for American Progress urges recognition of "competency" as particularly suitable to the results of self-directed learning (Soares, 2012). As yet, Prior Learning Assessment as described in this section focuses on traditional course credit, the foundation still for virtually all American postsecondary degrees.

directed learning a method or a feature of personality? Can we say that being a successful self-directed learner depends on having the proper disposition for it?

Scholars of self directed learning have formulated measures of “readiness,” or the capacity of individuals to be effective at self-direction. Estimating such capacity may begin with learners themselves reflecting on their own learning histories and preferences according to a simple classification (adapted from Grow, 1991) :

- *Dependent Learners* are low in self-direction and need a teacher to direct their work.
- *Interested Learners* show moderate self-direction, are motivated and confident, but may be limited by lack of knowledge of the subject or skill to be learned.
- *Involved Learners* show more self-direction and have basic knowledge and skills in a domain allowing them to view themselves as able to learn on their own with guidance.
- *Self-directed Learners* can act autonomously in their learning, planning, executing, and evaluating their learning with or without the help of a teacher.

Originally proposed as a series of stages describing ideal progress in a learning career, the four types of learning may also be understood as interacting features of any individual’s history, disposition, and circumstances. An advantage in OpenCourseWare is that technology can serve all four types. A crucial question, of course, is the need for a teacher. But “dependence” of that kind is being redefined by the new technologies with what they can offer in the presence of instruction (via recorded video and audio). So too may “dependence” in learning take on new meaning with opportunities in SDL for communication and collaboration with other learners, for some proponents of OCW a key element of their pedagogical promise.

More elaborate scales for measuring “readiness” for self directed learning have a found a place in assessment and employment. There has never been agreement on their validity or how well they can predict the actual performance of individuals in long-term workplace performance or personal development. Not surprisingly, “readiness” is determined according to any individual’s initiative, curiosity, enjoyment of learning, persistence, and more. The health sciences—particularly medicine, nursing, and pharmacy—have adopted measurement of this kind to promote self-directed learning in the formal curriculum and lifelong education.

But self-assessment has a role too in guiding learners toward general understanding of their strengths and weaknesses, including what is necessary for success in online learning, and thus OpenCourseWare. The Michigan Community College Association, through its Virtual Learning Collaborative, offers a free online interactive self-assessment as part of its ambitious “Introduction to Online Learning” which also guides students to online courses and degrees.

Of course, self-assessment of this kind focuses on what is internal to self-directed learning. But what is external also matters to the most convincing theories. Thus, however “ready” someone may be to learn on their own, circumstances will also play a key role in any decision to take up a learning project independently and online. Are the right resources available, including broadband connectivity to the Internet? Can learning with them be fitted to current obligations? What will completion of a course mean for the possibilities for entering (or resuming) and completing a degree program?

The sum of motivation and opportunity can be seen in the familiar idea of “drive,” conveying initiative, energy, and persistence, and the determination to complete projects small and large. A recent popular account of the psychology of motivation is organized around a simple but powerful idea: “Mastery [in work and elsewhere] is a mindset: It requires the capacity

to see our abilities not as finite but as infinitely improvable” (Pink, 2009). Perhaps there is some overstatement in “infinitely.” But what gains may come from self-direction and OpenCourseWare depend on a suitable configuration of realism and optimism.

## **Skills, Self-Improvement, and Well-Being**

While OpenCourseWare can be seen in relation to learning new skills, or strengthening current ones, the case for self-directed learning can be extended beyond workforce development. Indeed, by focusing exclusively on employment an important dimension of self-directed learning can be ignored. Skills matter for careers and economic success. But well-being in adulthood can be seen as more than prospering at work.

Well-being can include satisfaction in life more generally, with the experience of “positive emotions” as psychologists call them, like happiness, pleasure, and comfort. Well being can also reflect engagement in work for the intrinsic pleasures it brings, beyond what accomplishments are visible to others or bring greater income or power. Relationships also matter in well being, as does having a sense of purpose, with meaning or a sense of significance in what we do coming from different domains of life. A recently proposed research-based scale measuring “well being” featured: “I lead a purposeful and meaningful life,” “I am engaged and interested in my daily activities,” and “I am competent and capable in the activities that are important to me” (Diener et al, 2009). A diligent self-directed learner can gain from Open Educational Resources and OpenCourseWare experience that contributes to well-being.

Thus, when we associate self-direction with “self-improvement” we mean what is gained for our work but also what improvement means for the general conditions of life. If we are “flourishing” then we have, presumably, mobilized as many resources as possible for living in a satisfying manner with confidence in the future (Seligman, 2011). Improving the self can signify what we do to move from where we are today, or the reality of our circumstances, to what we can imagine as the results of getting better at what we do, or even mastering something new. In the words of an influential theorist of workplace psychology and career development: “Most sustainable behavioral change is intentional. Self-directed change is an intentional change in an aspect of who you are (the Real) or who you want to be (the Ideal), or both. Self-directed learning is self-directed change in which you are aware of the change and understand the process of change” (Boyatzis, 2004).

## **Networked Self-Direction**

As we all know, probably no recent development has the potential to influence self-directed learning like the Internet. “Self-direction” suggests learning driven by what is most internal to the learner, an expression of purposeful individualism. And self-directed learning does indeed require considerable inner motivation. But many online opportunities for SDL have a social dimension, in interaction with a teacher or with other learners.

A self-directed learner is not always a solitary one. Some popular OpenCourseWare sites are built around peer-to-peer learning. The key is how much learners decide about their own learning--its pace and how to make the best uses of resources, including what can be learned in social interaction. “Networking” became a popular term first to refer to the connectivity of

computers, increasing their capacity and power. The term has also come to mean the activities of individuals in enhancing their careers and social lives by systematically connecting with as many other people as possible.

Networked self-direction for learning can reflect elements of both. That is, a motivated self-directed online learner locates and uses as many online resources as are suitable to his or her purposes and learning preferences. The leading institutions now offering Massive Open Online Courses (or MOOCs, as described in Part 3 above) are searching for ways to make student-to-student interaction complement what can be learned from video lectures, texts, self-assessments, and features of OCW. As in traditional forms of learning, material resources (in this case online ones) can interact with human encounters in advancing skills and knowledge.

## **6. What's Ahead for OpenCourseWare?**

No one would deny that we are in a critical period in the history of American postsecondary education and its relations to work and careers (e.g. DeMillo [2011] among many recent studies). Students are borrowing at record rates for tuition and allied costs to attend traditional non-profit and, increasingly, for-profit institutions. Costs are one question but so too are the educational habits of American colleges and universities. For critics that means the priority given to faculty interests and prerogatives and indifference to the needs of students. And a familiar complaint is that inattention to students is an inevitable by-product of the competitive research ethos of American universities (Delbanco, 2011). Do we really need all the research we get?

In effect, OpenCourseWare represents new attention to teaching, this time with opportunities to reach greater numbers of students and, with other changes, to bring the “college payoff” (or “college advantage”) to more adult learners. It is now a commonplace to see the impact of technology on postsecondary education, particularly in the format and nature of teaching, as a “game changer” (Oblinger, 2012). All institutions will change to some degree but from the perspective of adults with uncertain working futures and limited opportunities for postsecondary learning—if in fact that has been seen as a possibility all—the Open Educational Resources movement can be a most welcome development.

### **Global Initiatives and Local Opportunities**

From its beginnings the OER movement has been a global one. UNESCO and the Commonwealth of Learning (an organization formed by the 54 nations of the British Commonwealth to promote distance and online education) have had important roles in gaining interest for the concept. In 2007 an international conference produced the Capetown Declaration, since widely cited as a rationale for global use and recognition of OER. And in June 2012 UNESCO convened the first World Open Educational Resources Congress which issued its own ten point declaration (Appendix 2).

What does the global dimension of the OER and OCW movement mean for Americans, and Michigan residents? These events and statements can seem remote from the circumstances of Michigan adult learners and their educational and training needs. But the worldwide movement can influence educational opinion, and ultimately local attitudes and even policy development. Coursera, which has been leading the effort to make OCW more visible, is now an international initiative, with participation (as of June 2012) from prestigious universities in Scotland and Switzerland. Some may say that American students will be able to study abroad without leaving

home.

To the degree that American institutions desire a worldwide audience for their OpenCourseWare they mount more and more high quality offerings that are available, of course, to American learners. That is the case with the University of Michigan's participation in Coursera and the development of its own OpenMichigan website. And global interest in OCW now includes attention to formal assessment and credentialing, or what will be necessary to legitimize the courses—individually and later perhaps aggregated into degrees.

There is plainly ferment in the worldwide educational community prompted by the potential in OER and OCW. The recent actions of leading American universities in the area of OpenCourseWare are one sign. And the OER Foundation is now organizing OERu with a founding group of 14 colleges and universities in 5 nations (including 2 in the U.S.). The goal is to facilitate assessment and credentialing of OCW students, whose courses can come from institutions around the world and whose degrees would come, initially at least, from a well regarded Australian university. Will American students seek OERu degrees? Perhaps only if our own system doesn't respond with its own opportunities for degrees incorporating success with OpenCourseWare.

### **From Declarations to Degrees**

Universities themselves are making OpenCourseWare an essential part of the emerging reconfiguration of postsecondary education. “Massive” participation (as in the new MOOCs) demonstrates widespread interest, particularly among adults acting as self-directed learners, many with interest in credit and degrees. OCW use can continue to grow in this fashion. But plainly the next step is the organization of a system for recognizing student achievement with academic credit for the many high quality courses already online and those that will surely follow.

According to Hal Plotkin (2010), an influential advocate for OCW, while the new format for learning is “ripe for development” that will not happen without public action: “A single missing ingredient is preventing the most promising outcomes associated with [OCW] from benefiting a wider audience: more active support and leadership from higher education governance officials.” OCW will only gain the role they merit in a “supportive policy framework.” And that can come about when state governments and agencies, and educational institutions at all levels, recognize what OCW can contribute to workforce and human development.

How might we reach “promising outcomes”? Moving from well intentioned global declarations to local adult degree attainment--a new phase of systematic OER and OCW development--can happen with activities in Michigan:

- *An Online OpenCourseWare Portal:* Right now, for adult learners, agency and government officials, and postsecondary leaders and faculty, learning about OER is as important as using them. Thus, a first step could be the building of an online OCW portal—with a focus on workforce development and degree attainment--hosted perhaps by the MSU Center for Regional Economic Innovation. It could be planned and designed in a collaborative effort representing knowledge of workforce development, the nature and uses of OpenCourseWare, procedures for assessing credit for OCW work, and degree programs at Michigan colleges and universities to which such credit might be applied. In effect, such a portal would resemble the centralized

service offered by the Michigan Virtual University, whose mission (despite the name) is focused on K-12 schooling and whose website presents a comprehensive view of online opportunities for K-12 students and teachers. And a new portal would complement projects of the Michigan College Access Network and the Michigan College Access Portal, both aimed primarily at high school students.

A portal focused on online postsecondary degree attainment could feature a brief history of OER and OCW, an account of their uses in career development, and a glossary of key terms in the emerging world of open online learning. It would also include key links to: providers of courses; services for gaining academic credit for successful work with OCR; and degree programs to which OCR credit might be applied. In the case of the last there is an online directory of online degree programs at Michigan community colleges (available at the website of the Michigan Community College Association's "Virtual Learning Collaborative"). There is now no such site for four year programs. While current opportunities are limited, this area of postsecondary learning is steadily expanding, in Michigan and elsewhere, particularly at vocationally oriented four year private institutions. In effect, a display of OCW related resources would be a step in the direction of a working network of institutions and organizations with the goal of increasing degree attainment in Michigan.

- *Promoting "Readiness" and Self-directed Learning:* However rapidly online learning has established itself in postsecondary education, it is still new to many adult learners who are likely to have completed much of their formal education before the digital revolution reached our schools, colleges, and universities. And, simply being a member of the so-called "Net Generation" does not guarantee ability with applying routine digital abilities to formal learning and degree attainment.

Institutions and agencies can help potential OpenCourseWare learners estimate their "readiness" for the motivation and self-direction open online courses require by directing them to free and easy-to-use self-assessments (e.g., the one available at the website of the Michigan Community College Association). The portal proposed above might include access to such tools. But institutions and agencies can contribute to learners' plans and OCW success by conveying the utility of adopting a self-directed stance toward learning within the formal structures offered by open online courses. The Michigan Community College Association might be invited to expand its online self-assessment to include attention to the latest developments in OCW, including the rapidly growing popularity of MOOCs.

Still, readiness is more than a matter of what individuals desire and can do, and what institutions can offer. Also necessary is a suitable infrastructure to capitalize on online opportunities. As the efforts by MichiganConnect demonstrate, broadband access to the Internet is still far from the expectations of many residents. Based on a 2011 survey MichiganConnect estimated that "approximately 2.9 million adults statewide do not have home broadband service, and adoption varies significantly across socioeconomic lines." Of course, those without broadband at home (whatever is available at public libraries) are least likely to benefit from OER and OCW. The state's colleges and universities can see themselves as partners of MichiganConnect in what it will take to increase degree attainment.

- *Institutional Commitments to OpenCourseWare and Prior Learning Assessment:* As the opportunities in OCW expand, Michigan colleges and universities will inevitably encounter learners' desires for recognition and credit. In this, while many institutions have accepted one

form or another of Prior Learning Assessment, the new conditions of OCW present demands on the system requiring rethinking how it can accommodate successful completion of open online courses from many sources (including the MOOCs of Coursera and other leading providers). Community colleges in particular will need a strategy, in particular those offering online degree programs to which OCW credit might be applied. The same is true of four year institutions offering such programs (though there are not many as yet).

Public community colleges and universities might work together in formulating consistent formats for assessing student requests for credit from successful completion of an open online course, a feature, again, of a potential network of OCW-related services. To date, only Lansing Community Colleges—among all state institutions—is participating in the promising new project initiated by the Council for the Advancement of Experiential Learning. In this case, the Council’s name is misleading. The new initiative—LearningCounts—is aimed at procedures for recognizing new forms of online education.

What kinds of policies might help? An example is the legislation signed in March 2012 by the governor of Colorado requiring the state’s public colleges and universities to have programs in place to accept “Prior Learning Assessment.” No forms of PLA are specified but the intent of the bill is, as it says, “to increase the likelihood that a student will complete his or her certificate or degree and achieve his or her academic and economic goals.” The bill addresses what is now often said in Michigan: “Colorado’s workforce development depends upon a well educated workforce with the academic credentials necessary to compete in the job market.” Can Michigan’s constitutionally autonomous colleges and universities respond to the newest conditions of adult online learning—via the Michigan Community College Association and the Presidents’ Council, State Universities of Michigan--without legislation requiring that they do so?

And institutional initiative might take a complementary direction. The University of Michigan is a founding member of Coursera, and it maintains an OpenMichigan website to represent all of its “open” activities, which includes a number of complete courses beyond its contributions to the new national for-profit provider. If other Michigan universities mounted similar websites—and, as Michigan does, encouraged its faculty to make complete courses available in user friendly digital formats—all such state-based OCW possibilities might appear at the online portal described above.

- *Online Degree Development:* OpenCourseWare learners aspiring to career development are likely to favor online degrees, if not exclusively so. Adult students might launch their postsecondary careers with OCW (assuming opportunities for assessment and credit), moving from successful OCW experience to enrolling in a two or four year degree program. If they are working, such students are also likely to prefer a program that is online. Or, a student might combine OCW-based credits with those previously earned in an interrupted postsecondary career. Or, a student might turn to OCW in conjunction with progress in a degree program (traditional or online) in order to facilitate completing it.

To the extent that such paths define OCW uses in Michigan, degree attainment will be limited by what is available in online degrees at the state’s colleges and universities. Online degrees are available in some fields at community colleges and private vocationally oriented four year institutions. Opportunities for online degrees are more limited at the state’s four year universities. It is important, with all of today’s attention to online learning, not to underestimate what a traditional on-campus education offers. Online degrees reflecting similar academic



expectations can complement the fuller educational and developmental opportunities typical of such educational paths. Still, how might the autonomy and inventiveness of the state's institutions be turned toward the development in a coordinated manner of new online degrees? That would be perhaps the most significant step in what might be called a "service system" recognizing the future of online learning. They might incorporate the uses of OpenCourseWare, particularly perhaps in meeting general education requirements across different degrees and institutions offering them.

Finally, institutional collaboration might also be possible in the designation of a unit of one of the Michigan universities to act on behalf of them all in offering adult learning online degree programs in the manner of Connecticut's Charter Oak College or New York's Empire State College. Courses would include OCW offerings from Coursera and other locations, and online courses now being offered by Michigan institutions, and those traditional courses, as suggested above, that can be produced in OCW formats. An even bolder approach would be designed along the lines of the new "flexible degree" program announced by the University of Wisconsin System (Chen, 2012). It features the competency approach used by the Western Governors University. The program (described in a brochure distributed as of now by the Office of the Governor) will offer degrees in a limited number of fields and invite adult students to combine what is available in OCW with UW online courses.

These four potential areas for collaborative activity do not exhaust the possibilities for informing Michigan adults--and college and university administrators and government and agency leaders--about OER generally and OCW in particular, or for related initiatives aimed at workforce and human development. OCW by itself cannot, of course, increase the rate of degree attainment in the state. But, given the steadily increasing role of online postsecondary education, and new developments in OpenCourseWare representing access to more and more high quality courses, self-directed adult learning can be a part of actions that promote a better educated and equipped workforce.

### **How Far Must Change Go?**

Stanford University president John Hennessey confessed recently that while he leads one of the world's premier research universities the number one topic on his mind is the future of online learning. In this domain, he believes, "there's a tsunami coming" (Auletta, 2012). And Hennessey convinced the *New York Times* opinion columnists Tom Friedman (2012) and David Brooks (2012), who rarely agree on anything, that his vision was the correct one. Both have endorsed OpenCourseWare as a reason to be hopeful about what is needed for the reform of higher education in the digital age.

There is unrest in American higher education, reflecting the pace of change in our increasingly digital nation. Self-styled visionaries are never reluctant to propose that everything must be rethought, or that the system must change at its foundations, if sparing the leading liberal arts colleges and research universities. A popular idea today is that higher education faces "disruption" by a new and necessary organizational and fiscal model based on what happens to businesses which lose touch with their customers in convenience and cost (Christensen et al, 2011). Of course, online learning would be essential to foundational change. According to its most enthusiastic advocates all teaching and learning would be global, collaborative, and highly interactive or participatory, with online courses consolidated into a worldwide network allowing

complete freedom for students to mix and match in earning a degree to be awarded by new and forward looking institutions recognizing academic achievement (e.g., Tapscott and Williams, 2010).

MIT leaders in their pioneering OCW project now see, with the prospects for academic credit based on free online courses from a growing number of leading universities, the need for “Certificate Colleges.” Their role would be to aggregate student achievements. Teaching would focus on what local faculty add, in leading discussions and other functions, to the content in Massive Open Online Courses (Choucri et al, 2012). Many faculty members will reject such new roles, with limits on teaching their own courses—until perhaps most or even all of the curriculum is online from Coursera, Udacity, and similar organizations who enter the OCW “market.” Advocates of such a reconfiguration will celebrate the savings in faculty costs—fewer local professors will be needed—and convenience for students. And some will suggest that the opportunity to learn from the “best professors at the best universities” adds to the benefits. But, an important question yet to be answered is just what kind of learning can be expected from OCW and how will students respond to the format of the MOOC (Edmundson, 2012).

However much recent attention they have gained, Open Educational Resources are still a new and in many ways unknown element of postsecondary education. There is no question of the rapid growth of OER, particularly in OpenCourseWare. And there are promising signs of public interest, as demonstrated in the enrollments—in the hundreds of thousands—of some recent Massive Open Online Courses. In August 2012 Coursera passed the million mark in enrollments, with substantial increases in participation by American students. But questions remain about harnessing the considerable promise in an emerging OCW system. Indeed, like traditional higher education in the U.S., it is hardly a “system” at all, with many forms of OpenCourseWare and with only signs as yet—if promising ones—of opportunities for recognizing with academic credit successful completion of the free and open courses.

This report has focused on the place of OpenCourseWare in today’s digitally-based “ubiquitous learning.” In particular, the report has explored OCW’s potential role in workforce development via degree attainment. What success there is capitalizing on the newest digital opportunities will depend on adult learners themselves but also on what institutions do to make themselves hospitable to the new conditions of postsecondary education. Peter Drucker’s optimism about prospects for a “knowledge society” reflected his belief in the adaptability of American colleges and universities. Critics want “disruption” at the core of the system. But change can be fruitful without being, in all respects, foundational. There is great promise in OpenCourseWare, with initiatives that recognize adult interest in lifelong learning.

## Appendix

### Appendix 1

#### Open Educational Resources: Unschooled Learning

This report has focused on OpenCourseWare. Open Educational Resources represent what technology offers learners seeking new knowledge and skills for many purposes outside the framework of formal schooling. Thus, “unschooled” is used here to signify that these resources lie outside the familiar format of the course. But they are still educational. Using them systematically—as in identifying allied resources at many Internet locations—requires considerable self-direction, as is the case with OCW.

There is no universal index of unschooled educational resources organized by topic. Some might say that, to a degree, Google Search serves this goal. And of course *Wikipedia* is also a useful point of departure for self-directed online learning outside the framework of course-based study. So too is the less well known *Encyclopedia of Life*, which features biology and related sciences.

Selection and integration of such OER is needed to give such resources coherence and meaning. Using such resources is much less likely to lead to recognition and credit toward degrees than using OpenCourseWare. But, the case for recognition of work experience might well be enhanced by judicious use of unschooled OER for the contributions they can make to demonstrating skill and knowledge.

OER are abundant and increasing steadily. But they are not always easy to locate. The vastness of the Internet means that any potential OER user—in the spirit of self-directed learning—must have a learning objective in mind, and digital persistence and patience. What follows is simply a sampling of widely used unschooled OER:

- The Khan Academy is an extensive and acclaimed collection of brief instructional videos—now over three thousand!-- in mathematics (its original mission) and other subjects. Salman Khan, the primary instructor, is more tutor than teacher in guiding students through brief and informally but very effectively illustrated lessons. The lessons themselves, as Kahn has produced them, have a distinctly “do-it-yourself” manner, encouraging students in the belief that they can master a subject when it is broken into manageable units allowing for repeated study according to the needs of the learner, not often possible in the conventional classroom.
- TED Talks and Ted ED are products of an unusual but now very influential project: the annual conferences in Technology, Entertainment, and Design attended by leaders in these fields. Talks presented at affiliated TED conferences are also now available online. The talks are presented by people in many fields. They are invited to present a “talk” (of 18 minutes or less) representing how what they are doing in science, psychology, technology, design, and many other domains, is an innovation worth attention. Millions of people around the world have watched TED Talks, which belie the common judgment today that there can be no serious learning from lectures. A new feature of the TED project is Ted Ed which offers talks illustrated by artists and designers to offer a distinct visual and cognitive experience.
- Online Museums and Libraries have had historical roles as “open” resources in the traditional sense, making knowledge available to the public and supporting learning in many forms. In this

sense, for example, The U.S. Library of Congress and the Smithsonian Institution are two of the nation's (and the world's) most extensive and best known locations for OER. They serve millions of visitors online with print and multi-media resources, exhibits, and more.

- Project Gutenberg demonstrates that books will remain indispensable resources for learning even in our wired world. Over 40,000 searchable books are available free and online. The HathiTrust is a partnership of research libraries all over the world making available a vast digital and searchable collection. The Directory of Open Access Journals demonstrates the revolution in academic research in many fields, with journals increasingly available to anyone. While many are specialized, there are still many others that a resourceful self-directed student can find useful.

- Connexions is a collection of educational resources—sometimes called “learning objects.” A similar service is MERLOT (Multimedia Educational Resource for Learning and Online Teaching). Both are aimed at educators and academic authors seeking open course materials for courses and textbooks in many subjects in the curriculum. But individual learners also use both services after having identified the utility of particular resources to their educational goals.

- OER Commons names its self as the location for “teaching and learning content from around the world.” The site is dominated by small units of instruction aimed at teachers at all levels who invited to incorporate the resources into their courses and assignments. A self-directed learner might find many useful learning opportunities but would have to assemble an experience that resembles a course. Where the site does offer full courses many are borrowed from well known institutional sites (like MIT).

- Peer2Peer University is not a degree granting institution nor does it offer conventional courses. Its mission is to bring together people with shared interests who themselves construct a set of organized educational activities. These can include reading and writing discussions and forums, group projects and more. The work is designed, managed and assessed by participants, or “peers.” The P2PU website serves to make known such learning opportunities and is a platform for group interactions. There are no restrictions on subjects but P2P University is loosely organized into “schools” featuring “social innovation,” “mathematics,” “education,” and “webcraft.” The last is a useful way to gain knowledge of the Web and how to use it for learning.

- The Internet Archive is perhaps the most extensive Internet-based collection of educational resources. It includes books, courses, video and audio collections, and more. The Archive specializes in preserving “born digital materials.” It is a unique online location but its scale and the diversity of its collections can sometimes make it hard to locate resources.

## Appendix 2

### 2012 WORLD OPEN EDUCATIONAL RESOURCES (OER) CONGRESS PARIS DECLARATION

The UNESCO Congress, recognizing previous international statements and initiatives, recommends that states, within their capacities and authority:

1. *Foster awareness and use of OER.* Promote and use OER to widen access to education at all levels, both formal and non-formal, in a perspective of lifelong learning, thus contributing to social inclusion, gender equity and special needs education. Improve both cost-efficiency and quality of teaching and learning outcomes through greater use of OER.
2. *Facilitate enabling environments for use of Information and Communications Technologies (ICT).* Bridge the digital divide by developing adequate infrastructure, in particular, affordable broadband connectivity, widespread mobile technology and reliable electrical power supply. Improve media and information literacy and encourage the development and use of OER in open standard digital formats.
3. *Reinforce the development of strategies and policies on OER.* Promote the development of specific policies for the production and use of OER within wider strategies for advancing education.
4. *Promote the understanding and use of open licensing frameworks.* Facilitate the re-use, revision, remixing and redistribution of educational materials across the world through open licensing, which refers to a range of frameworks that allow different kinds of uses, while respecting the rights of any copyright holder.
5. *Support capacity building for the sustainable development of quality learning materials.* Support institutions, train and motivate teachers and other personnel to produce and share high-quality, accessible educational resources, taking into account local needs and the full diversity of learners. Promote quality assurance and peer review of OER. Encourage the development of mechanisms for the assessment and certification of learning outcomes achieved through OER.
6. *Foster strategic alliances for OER.* Take advantage of evolving technology to create opportunities for sharing materials which have been released under an open license in diverse media and ensure sustainability through new strategic partnerships within and among the education, industry, library, media and telecommunications sectors.
7. *Encourage the development and adaptation of OER in a variety of languages and cultural contexts.* Favor the production and use of OER in local languages and diverse cultural contexts to ensure their relevance and accessibility. Intergovernmental organizations should encourage the sharing of OER across languages and cultures, respecting indigenous knowledge and rights.
8. *Encourage research on OER.* Foster research on the development, use, evaluation and re-contextualization of OER as well as on the opportunities and challenges they present, and their impact on the quality and cost-efficiency of teaching and learning in order to strengthen the evidence base for public investment in OER.

9. *Facilitate finding, retrieving and sharing of OER.* Encourage the development of user-friendly tools to locate and retrieve OER that are specific and relevant to particular needs. Adopt appropriate open standards to ensure interoperability and to facilitate the use of OER in diverse media.

10. *Encourage the open licensing of educational materials produced with public funds.* Governments/competent authorities can create substantial benefits for their citizens by ensuring that educational materials developed with public funds be made available under open licenses (with any restrictions they deem necessary) in order to maximize the impact of the investment.

## Glossary

**Academic Credential:** A diploma or certificate indicating the completion of a course of study, often necessary for entry into many forms of work.

**Accreditation:** Recognition of a postsecondary institution as having met standards for quality, typically by a regional or national accrediting agency.

**Asynchronous Learning:** A learning activity in which communication between students with one another and the instructor takes places at different times, allowing participation according to the schedules and preferences of learners.

**CLEP:** The "College Level Examination Program," a series of test administered by the College Board allowing students to demonstrate college-level proficiency in a specific subject area, reflecting learning out of school.

**Competency-based Learning:** Educational outcomes based on mastery of a subject of skill, typically measured by tests, and not necessarily the completion of a course.

**Computer-based Training:** Automated instruction via interaction with a computer instead of a live teacher.

**Credit:** A common unit of measurement recognizing the completion of academic work, typically in a course.

**Degree Attainment:** Completion of a program of courses in a field of study and practice, resulting in an associate degree from a community college, a bachelors at a four year institution, or a graduate degree in one of many forms from a college or university.

**Degree Program:** An ordered series of courses culminating in an associate, bachelor, or graduate degree.

**Digital Literacy:** The ability to make effective use of information and communication technologies.

**Drive:** To work with determination and vigor toward a goal, including those associated with the uses of online educational resources OpenCourseWare.

**e-Learning:** The use of digital technologies to support teaching and learning in synchronous, asynchronous, instructor-led or computer-based forms, or some combination of them.

**Experiential Learning:** Knowledge and skills derived from experience in the workplace or any other setting, sometimes presented for postsecondary academic credit via CLEP.

**Formal Learning:** Learning acquired via courses and instruction, often as part of a degree program.

**Hyperlink:** An element of a digital document that connects to something in the same document or to an electronic resource elsewhere (another document, website, etc.).

**Informal Learning:** Knowledge and skills derived from activities other than formal course-based instruction.

**Interactivity:** Interactions between learners and online resources or between learners, the instructor, and other participants in an online course or activity.

**Knowledge Society:** The descriptive phrase introduced by management scholar Peter Drucker to signify a change in the economic foundations of modern life, with knowledge (largely via formal learning) being the primary lever of opportunity and prosperity rather than physical labor.

**Lifelong Learning:** The pursuit of skills and knowledge beyond the years of formal schooling, including opportunities via the new information and communications technologies. Lifelong learning can focus on informal learning and/or degree attainment.

**Massive Open Online Course (MOOC):** A free and open online course with global enrollment in the thousands, sometimes the tens of thousands, and typically offered by leading research universities.

**Non-Traditional Student:** Also called "adult student", "adult learner", "re-entry student", or "returning student" who often delays enrollment in postsecondary education, and works part or full time while enrolled part-time.

**Open Educational Resources:** The vast array of free online resources for learning, including courses and course-based materials, textbooks, video and audio, multimedia applications, educational websites, reference works, games, simulations, self-assessments, and more.

**OpenCourseWare:** A category of Open Educational Resources, featuring complete online courses with different combinations of text, video, audio, assessments, and other resources.

**Prior Learning Assessment (PLA):** A process allowing for the assessment for academic credit of college-level learning experiences of different kinds, including non-credit open online courses.

**Search Engine:** A searchable database or index, containing thousands or millions of Web sites, pages or documents. It allows the user to search by entering keyword(s) or phrases, then executes the search in its database to find matches to the query.



**Self-directed Learning:** The pursuit of education, in informal and formal settings, with independent or autonomous activity, sometimes jointly with other students and a teacher.

**Self-efficacy:** The personal beliefs individuals have that they are capable of learning and particular behaviors.

**Synchronous Learning:** An e-learning activity usually led by an instructor with interaction occurring simultaneously in real-time.

**Ubiquitous Learning:** The activity of learning as it is made available electronically in any place, at any time, in any subject, and across the life course.

**User Experience:** The experience an online learner has when engaged with a digital educational resource.

**Well-being:** A feeling of satisfaction in life, including engagement in work, family, and community life, with a range of cognitive abilities and emotional resources.

## Works Cited

- Allen, I.E. and Seaman, J. (2012a) *Going the distance: Online education in the United States*, 2011. Boston, MA: Babson Survey Research Group.
- Allen, I.E. and Seaman, J. (2012b). *Conflicted: Faculty and online education*, 2012. Boston, MA:  
Babson College Research Survey Group
- Arendt, A. and Shelton, B. 2009. Incentives and disincentives for the use of OpenCourseWare. *International Review of Research in Open and Distance Learning*, 10(5).
- Auletta, K. (2012). Get Rich U. *New Yorker*, April 30.
- Bandura, A. (1997). *Self-efficacy: The exercise of self-control*. New York: Freeman.
- Bornstein, D. (2012). Open education for a global economy. *New York Times*, July 11.
- Boyatzis, R. (2004). Self-directed learning. *Executive Excellence*, 21(2): 11-12.
- Brooks, D. (2012). The campus tsunami. *New York Times*, May 3.
- Burbules, N. (2010). Meanings of Ubiquitous Learning. In B. Cope and M. Kalantzis (eds.), pp. 15-20. *Ubiquitous Learning*, Urbana and Chicago, IL: University of Illinois Press.
- Carnevale, A., Smith, N., and Strohl, J. (2010). *Help wanted: Projections of jobs and education requirements through 2018*. Washington, DC: Georgetown University Center on Education and the Workforce.
- Carnevale, A., Rose, S., and Cheah, B. (2011). *The college payoff: Education, occupations, lifetime earnings*. Washington, DC: Georgetown University Center on Education and the Workforce.
- Carnevale, A., Jayasundera, T., and Cheah, B. (2012). *The college advantage: Weathering the economic storm*. Washington, DC: Georgetown Center on Education and the Workforce.
- Chen, A. (2012). Online degree program lets students test out of what they already know. *Chronicle of Higher Education*, June 20.
- Christensen, C., Horn, M., Soares, L. and Caldera, L. (2011). *Disrupting college: How disruptive innovation can deliver quality and affordability to postsecondary education*. Washington, D.C.: Center for American Progress.
- Collins, A. and Halverson, R. (2009). *Rethinking education in the age of technology: The digital revolution and schooling in America*. New York: Teachers College Press.

- Cope, B. and Kalantzis, M. (Eds.), (2009). *Ubiquitous Learning*, Urbana and Chicago, IL: University of Illinois Press.
- Delbanco, A. (2012). *College: What it was, is, and should be*. Princeton, N.J.: Princeton University Press.
- DeMillo, R. (2011). *Abelard to Apple: The fate of American colleges and universities*. Cambridge, MA: MIT press.
- Diener, E., Wirtz, D., Biswas-Diener, R., Tov, W., Kim-Pietro, K., Choi, D., and Oishi, S. (2009). New measures of well-being. In E. Diener (Ed.), *Assessing Well-being*, pp. 247-266. New York: Springer.
- Drucker, P. (1969). *The age of discontinuity: Guidelines to our changing society*. New York: Harper and Row.
- Drucker, P. (2001). The next society. *The Economist*, November 1.
- Edmundson, M. (2012). The trouble with online education. *New York Times*, July 19.
- Fain, P. (2012a). Prior learning assessment catches on, quietly. *InsideHigherEd*, May 7.
- Fain, P. (2012b). Earning college credit for MOOCs through prior learning assessment. *InsideHigherEd*, June 15.
- Foreward, M.L. (2012). OpenCourseWare. In D. Oblinger (Ed.), *Game changers: Education and information technologies*, pp. 291-299. Louisville, CO: EDUCAUSE.
- Friedman, T. (2012). Come the revolution. *New York Times*, May, 15.
- Glazer, L. and Grimes, D. (2011). *Michigan's transition to a knowledge-based economy: Fourth annual progress report*. Ann Arbor, MI: Michigan Futures.
- Good, L. (2012). Reimagining Michigan's workforce development and policy. Ann Arbor, MI: Corporation for a Skilled Workforce.
- Grow, G. (1991). Teaching learners to be self-directed. *Adult Education Quarterly*, 41(3): 125-149
- Holzer, H. and Lerman, R. (2007). *America's forgotten middle-skills jobs: Education and training requirements in the next decade and beyond*. Washington, DC: Workforce Alliance.
- Kamenetz, A. (2010). *DIY U: Edupunks, edupreneurs, and the coming transformation of higher*

*education*. White River Junction, VT: Chelsea Green.

- Kamenetz, A. (2011). The transformation of higher education through prior learning assessment. *Change*, September/October.
- Kamenetz, A. (2012). *The edupunk's guide to a DIY credential*. Seattle, WA: Bill and Melinda Gates Foundation.
- Kirwan, W. (2012). Not college for all, but college for more. *Washington Post*, June 7.
- Knight, E. and Casilli, C. (2012). Mozilla open badges. In D. Oblinger (Ed.), *Game changers: Education and information technologies*, pp. 279-284. Louisville, CO: EDUCAUSE.
- Lewin, T. (2012). Universities reshaping education on the Web. *New York Times*, July 17.
- Lingenfelter, P. (2012). The knowledge economy: Challenges and opportunities for American higher education. In D. Oblinger (Ed.), *Game changers: Education and information technologies*, pp. 9-23. Louisville, CO: EDUCAUSE.
- Dobbs, R., Madgavkar, A., Barton, D., Labaye, E., Manyika, J., Roxburgh, C., Lund, S., and Madhav, S. (2012). *The world at work: Jobs, pay, and skills for 3.5 billion people*. New York: McKinsey Global Institute.
- Means, B., Toyama, Y., Murphy, R., Bakia, M., Jones, K. (2010). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. Washington, D.C.: U.S. Department of Education.
- Mendenhall, R. (2012). Western Governors University. In D. Oblinger (Ed.), *Game changers: Education and information technologies*, pp. 115-132. Louisville, CO: EDUCAUSE.
- Merriam, S., Caffarella, R. and Baumgartner, L. (2006). Self-directed learning. In S. Merriam, R. Caffarella, and L. Baumgartner, *Learning in adulthood: A comprehensive guide*, pp. 105-129. San Francisco, CA: Jossey-Bass.
- Murray, C. (2008). *Real education: Four simple truths for bringing America's schools back to reality*. New York: Crown.
- Oblinger, D. (2012). IT as a game changer. *EDUCAUSE Review*, May/June: 11-24.
- Office of the Governor, State of Wisconsin. (2012). Accessible at: [wi.gov/Images/News/6.19.12 UW Flexible Degree Proposal Packet.pdf](http://wi.gov/Images/News/6.19.12_UW_Flexible_Degree_Proposal_Packet.pdf)

- Pink, D. (2009). *Drive: The Surprising Truth about What Motivates Us*. New York: Riverhead.
- Plotkin, H. (2010). *Free to learn: An open educational resources policy development guidebook for community college governance officials*. San Francisco, CA: Creative Commons.
- Reynolds, H. (2012). *The higher education bubble*. New York: Encounter.
- Rheingold, H. and Weeks, A. (2012). *Net Smart: How to Thrive Online*. Cambridge, MA: MIT Press.
- Samuelson, R. (2012). It's time to drop the college for all crusade. *Washington Post*, May 27.
- Samuelson, R. (2012). Scrapping college for all (part 2). *Washington Post*, June 12.
- Sclater, Niall. (2011). Open educational resources: Motivations, logistics, and sustainability. In N. Ferran and J. Minguillon (eds.), *Content management for e-learning*, pp. 179-193. New York: Springer.
- Seligman, M. (2011). *Flourish: A visionary new understanding of happiness and well-being*. New York: Free Press.
- Smith, M. (2009). Opening education. *Science*, January 2: 89-93.
- Soares, L. (2012). *A 'disruptive' look at competency-based education: How the innovative use of technology will transform the college experience*. Washington, D.C.: Center for American Progress.
- Tapscott, D. and Williams, A. (2010). Innovating the 21<sup>st</sup> century university: It's time. *EDUCAUSE Review*, 45(1): 16-29.
- Thelin, J. (2011). *A history of American higher education*. Second Ed. Baltimore, MD: Johns Hopkins University Press.
- UNESCO. (2002). Forum on the impact of OpenCourseWare for higher education in developing countries: Final report. Paris: UNESCO.
- UNESCO Institute for Lifelong Learning. (2012). *Guidelines for the recognition, validation, and accreditation of the outcomes of non-formal and informal learning*. Hamburg: Institute.
- UNESCO and Commonwealth of Learning. (2011). *Guidelines for open educational resources in higher education*. Paris: UNESCO
- Van Horn, C., Zukin, C., Szeltner, M., and Stone, C. (2012). *Left out. Forgotten? Recent high school graduates and the great recession*. New Brunswick, NJ: John J. Heldrich Center for

Workforce Development.

Walsh, T. (2010). *Unlocking the gates: How and why leading universities are opening up access to their courses*. Princeton, NJ: Princeton University Press.

Weissmann, J. (2012). The single most important experiment in higher education. *The Atlantic*, July 18.

Workforce Alliance. (2009). Michigan's forgotten middle-skill jobs: Meeting the demands of a 21<sup>st</sup> century economy. Washington, D.C: The Workforce Alliance

# About REI

The MSU EDA University Center for Regional Economic Innovation (REI) has established a unique new-economic development ecosystem that engages innovative mindsets resulting in new economic development practices that are congruent with the new global and regional economic realities. Through a process of responsive community engagement, strategic partnerships, and collaborative learning REI may result in the best and brightest economic development professionals in the world.

REI Center was established in 2011 with support from the U.S. Department of Commerce, Economic Development Administration in collaboration with the following MSU offices:

- MSU Office of the Provost
- MSU Vice President for Research & Graduate Studies
- MSU University Outreach & Engagement
- MSU Extension
- MSU Institution for Public Policy & Social Research
- MSU School of Planning, Design, & Construction
- MSU Department of Geography
- MSU College of Social Science

**MICHIGAN STATE**  
UNIVERSITY

Center for Community  
and Economic Development

EDA University Center for Regional Economic Innovation  
Center for Community & Economic Development  
1615 E. Michigan Avenue  
Lansing, MI 48912 USA  
<http://www.reicenter.org>



The statements, findings, conclusions, and recommendations are those of the authors and do not necessarily reflect the views of the Economic Development Administration or the U.S. Department of Commerce.