White Paper:

OPEN EDUCATIONAL RESOURCES

Breaking the Lockbox on Education

November 2013

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THE WILLIAM AND FLORA HEWLETT FOUNDATION

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PREFACE

The Hewlett Foundation's Education Program is committed to openness and transparency in its grantmaking. Recently, the Program revisited its Open Educational Resources (OER) strategy in an effort to better understand how its philanthropic investments—within the context of the larger funding landscape—can help integrate OER into mainstream education. We conducted dozens of expert interviews and commissioned new research and analysis. The result of our research is this white paper, which presents a roadmap for transforming teaching and learning by shifting OER from a small-scale movement to standard education practice.

The early adopters of OER believed that education is a public good and that openness, embedded as an essential element of the teaching and learning process, can have a strong, positive effect in education. The goal is not to further OER as a movement itself, but to contribute to the equalization of access to knowledge for all and demonstration that the teaching and learning experience can be improved even as fiscal resources decline. Bringing this aspiration to fruition in mainstream education will require focus, collaboration, and a community of supporters from multiple sectors.

SUMMARY

The idea behind Open Educational Resources (OER) is simple but powerful—educational materials made freely and legally available on the Internet for anyone to reuse, revise, remix and redistribute.[1] These digital materials have the potential to give people everywhere equal access to our collective knowledge and provide many more people around the world with access to quality education by making lectures, books and curricula widely available on the Internet for little or no cost. By enabling virtually anyone to tap into, translate and tailor educational materials previously reserved only for students at elite universities, OER has the potential to jump start careers and economic development in communities that lag behind. Millions worldwide have already opened this educational lockbox, but if OER is going to democratize learning and transform the classroom and teaching, then it must move from the periphery of education practice to center stage.

The Foundation plans to help pave the way for that transition and this white paper describes how we plan to accomplish that goal. It answers four key questions:

1. **Why is Hewlett committed to continued investment in OER?** Since the Hewlett Foundation began investing in OER in 2002, the field has blossomed from the seed of an idea into a global movement. Now, OER is poised to influence mainstream education, changing the nature of schooling for students, self-taught learners, educators, and institutions around the world.

2. **What will success look like?** By 2017, OER will be increasingly integrated into standard education practice, improving the effectiveness of schooling at all levels throughout the United States and around the globe. OER producers will supply high-quality, personalized instructional materials for a wide range of courses – from the most basic, primary school-level subjects to the most popular credit-bearing courses in colleges in the United States. Those materials will be organized in a way that enables in-classroom adoption simple enough to encourage widespread use. At the same time, key OER providers around the globe will be on a path to sustainability, receiving funding from governments, other philanthropies, institutions, revenues and other private sources.

3. **What investments are needed to achieve this goal?** The Program envisions investing in the infrastructure required for mainstream adoption of OER. Once in place, this infrastructure will deliver high quality content, promote supportive policies, and develop practical standards for OER materials. The Program also aims to underwrite research and support innovation as opportunities emerge.

4. **How will the plan be implemented?** The Program plans to continue strategic investments in OER in close cooperation with other funders.

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[1] http://www.americanprogress.org/issues/labor/news/2012/02/07/11167/dramatically-bringing-down-the-cost-of-education-with-oer/

After an early focus on supply, the Program has begun shifting its spending priorities to a strong push for more adoption of OER as primary teaching and learning resources, policy change and standards adoption, accompanied by continuing funding for innovation. The Program also has defined a set of outcome-focused metrics and targets that it will continually refine.

1. WHY IS HEWLETT COMMITTED TO ONGOING INVESTMENT IN OER?

The rationale

In the United States and around the world, the demand for high quality education has never been greater. By 2025 there will be 263 million students who will be eligible for higher education[2]. In order to accommodate this demand, at least 4 universities of 30,000 students would need to open every week for the next 15 years.

Clearly, traditional avenues to quality education are not meeting this demand. Our view is that Open Educational Resources can play an important role in meeting this need and ensuring equal access to knowledge for teachers and students around the globe.

Since the Hewlett Foundation began investing in open educational resources in 2002, the field has blossomed from the seed of an idea into a global movement. In those early days, the Foundation recognized the revolution OER represented, and helped catalyze the movement by funding the Massachusetts Institute of Technology's online course project known as OpenCourseWare. Since that initial grant, the Education Program has invested in the infrastructure, early demonstrations and leaders that have helped make the movement possible, including flagship projects, tools and guidelines, advocacy and research. In 2012, the formal adoption of the Paris OER Declaration-- which calls on governments worldwide to openly license publicly funded educational material--signaled the growing strength of the movement on an international scale. Today, OER is poised to improve access to and quality of schooling for students, self-taught learners, educators, and institutions around the world. The Program's OER grantees have helped:

- Establish the meaning of "openness[3]" and build the necessary legal infrastructure for OER;
- Demonstrate the utility of open access to educational resources and challenge the world's elite universities to fulfill their social missions;
- Deliver learning to a wider population of students with fewer resources through open online courses and textbooks;
- Deliver invaluable lessons and materials to thousands of teachers around the world; and
- Support and grow a community of thousands of educators and learners committed to the belief that openly licensed educational

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[2] British Council and IDP Australia projections

[3] The terms "free" and "open" often have different meanings for different audiences. Within this paper, "free" refers to free or gratis access to a resources. "Open" refers to free access *in addition to* the legal rights to reuse, revise, remix, and redistribute a resource.

resources can deliver equal or better quality resources at a lower cost and improve learning outcomes.

OER plays a key role in the broader Education Program. In 2010, the Program adopted a new seven-year strategy that specifically aimed to give all students access to rigorous, relevant, and innovative educational opportunities. The new strategy lays out a plan for confronting these challenges through investment in three areas:

- *Deeper Learning*: Increase economic opportunity and civic participation by expanding what students learn, deepening the experience through which they learn it, and improving the benchmarks for measuring their knowledge.
- *Open Educational Resources*: Equalize access to knowledge for teachers and students around the globe.
- *California Education*: Improve the conditions for education reform in California.

These initiatives are mutually beneficial. For example, OER provides a powerful means to grow the impact of Deeper Learning, and Deeper Learning provides a definition of high quality learning for OER to design toward. With that in mind, the Program has fostered cross-pollination in its grant giving over the past three years. Take, for example, the grantee Expeditionary Learning. An innovator in deeper learning teaching materials, Expeditionary Learning developed English Language Arts and Literacy common core aligned curricula for Grades 3 – 8 that the New York City Department of Education named its preferred curricula earlier this year. The materials are openly available online.

While the movement has made great strides, only a fraction of its enormous potential has been fulfilled and there remains much work left to be done if OER is to become self-sustaining. The enthusiasm of early adopters has not yet spread to the education community at large, a predicate for OER's transition to the center of educational debate internationally. Until then, it is clear that OER will continue to require some combination of government support, private capital, and philanthropic funding.

Education today and the unique value of OER

OER can make an important contribution to the most pressing problem facing education systems in the United States and around the world: delivering better results with fewer resources.

In the United States, state and local governments have made deep cuts in education over the past few years as they've grappled with declining revenues that are the result of the worst recession since the Great Depression. While the trend may be reversing as the broader economy improves, overall school funding remains well below pre-recession levels. Thirty-five states are providing less K-12 funding per student than they did in 2008; seventeen states have cut per-student funding by more than 10 percent [Oliff, Mai, and Leachman, 2012]. In higher education, states currently are spending 28 percent less per student than they did in 2008. With the exception of Wyoming and North Dakota, every state also

is spending less per student on higher education than before the recession [Oliff, Palacios, Johnson, and Leachman, 2013].

While overall state spending has contracted, interest in innovation and private investment in education has nearly quadrupled in a decade, from $62 million in 2005 to an estimated $1.1billion in 2012 [GSV Advisors, 2012]. This education technology investment has given rise to a number of new players that, like OER, are looking to retool classrooms.

The resource challenges faced by public school systems, as well as the appetite and interest in technology-driven solutions, present a unique opportunity for OER to enter the mainstream and improve educational outcomes. The movement can provide schools at all levels with tools to survive and even thrive in hard times. OER can:

- **Radically reduce costs**. Facing a budget gap of nearly $19 billion in 2010, California initiated the Free Digital Textbook Initiative to cut costs by aligning open textbooks, with the state's curriculum standards [McNichol and Johnson, 2010; Fensterwald, 2010; California Learning Resource Network, 2010]. At the university level, The Vietnam Foundation has produced more than 20,000 teaching and research modules, available at no cost to students, professors, faculty members, and all other interested learners. Also in higher education, the OER university[4] is a growing partnership of like-minded institutions committed to creating pathways for OER learners to gain academic credit in the formal education system at a much lower price.

- **Deliver greater learning efficiency.** Salt Lake City demonstrated improved scores on state tests for 1000s of students with $5 open textbooks that replaced $80 proprietary textbooks. At the same time, Carnegie Mellon University's Cognitive Tutor program has helped students complete Open Learning Initiative courses in half the time and with greater learning gains than those enrolled in traditional courses [Lovett, 2008].

- **Promote continuous improvement of instruction and personalized learning.** In the San Francisco Bay Area, Leadership Public Schools has partnered with CK-12 to adapt their original, open-source textbooks into a series, each version targeting students at different reading levels. At Utah's Open High School, where open resources are used throughout the curriculum, teachers continually customize coursework to match state standards and meet students' individual needs.

- **Encourage translation and localization of content.** Courses made available by MIT's OpenCourseWare have been translated into at least ten languages while openly licensed interactive science simulations produced by Physics Education in Technology are available in seventy four languages. Teacher Education in Sub Saharan Africa (TESSA) materials are

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[4] http://wikieducator.org/OER_university

available in four languages and adapted culturally for use in twelve countries.

- **Offer equal access to knowledge for all.** Open online courses have made it possible for anyone anywhere to master material anytime without being enrolled in an educational institution. WikiEducator, a global community of nearly 19,000 educators, focuses on creating and sharing classroom resources, lecture notes, textbooks, and planning and policy documents. Its online resources are now being used in 110 countries and have been viewed more than nine million times. Physics Education and Technology (PhET) OER science simulations have been translated into over 70 languages and run over 40 million times in 2012. And the Khan Academy, which offers 4,100 openly-licensed videos along with an ever-growing exercise platform in math, reports more than 250 million videos viewed and more than a billion problems completed.

Barriers to mainstream adoption

The use of OER has grown significantly over the last ten years: Today, 40 percent of K-12 educators in the U.S. are using OER to supplement their core materials [BCG, 2012], an indication that adoption has moved beyond a small set of early adopters and that OER are making their way into regular classrooms. However, the movement now faces a chasm between supplementary usage and primary adoption-- a common problem faced by innovation [Moore, 1999]. Crossing that divide would involve displacing traditional textbooks with OER materials—a challenge, given the currently low levels of OER primary adoption (at present, only 10% of K-12 educators in the U.S. are using OER as primary material [BCG, 2012].

Research shows that several barriers must be overcome before the majority of students, educators, and schools will adopt OER as their primary material in the classroom. The Program can help build an OER infrastructure capable of overcoming these barriers. They are:

- **Uneven, disorganized supply**. While some successful demonstrations of OER are beginning to surface within the mainstream education system, OER does not yet include a full set of high-quality materials for everyday use by educators in the most widely taught K-12 and post-secondary subjects. Although real strides have been made in terms of the quantity of supply in recent years, progress seems to be uneven: content in math and science are more available than OER's coverage of English/language arts and social science. Across the board, there are few examples of complete, off-the-shelf offerings that teachers easily can adopt as their primary resources. While there are a handful of efforts to create open textbooks, such as CK12 and the Utah Open Textbook Project at the K-12 level and Rice University's OpenStax at the post-secondary level, the majority of OER require teachers to find individual resources and weave them together into a meaningful lesson or course. More emphasis on creating complete products from the existing supply of materials would encourage more widespread adoption of OER in regular classrooms.

Incompatible policies and lack of incentives. In the United States, some states require that content producers pay for review by education officials to defray costs of reviewers' time— a hurdle for non-profits that produce OER. Many other states only use educational materials when they come bundled with assessment items and professional development services, which OER producers do not always offer. Internationally, some education ministries will not adopt materials that are not available in all local languages, which many OER are not. While OER can be readily translated, making it attractive in the long-run, more traditional resources have already been translated, giving them an advantage in the short-run. Finally, within higher education institutions, many faculty would like to openly license and share their research and educational resources. To get promoted and earn tenure, though, better metrics about the impact of these shared resources on their fields also need to be available.

- **Lack of standards.** A great deal of OER materials remain hard to find. Without a common system of identification, teachers can't easily search for material. Moreover, teachers often cite the lack of a "clearinghouse" vetting OER as a major stumbling block to more widespread use of the resources.[5] Efforts such as the Learning Resource Metadata Initiative are attempting to address this issue. Until a common system is widespread, though, this dearth of standards makes OER difficult to integrate into the learning management and student data systems used by schools and educators.

- **Limited proof of effectiveness.** While some progress has been made in demonstrating the gains in productivity and educational effectiveness that OER can deliver, there is not yet a comprehensive body of evidence that can convince policymakers and educators to adopt OER. Because many producers have limited marketing machinery compared to the sales forces that support proprietary content, good outside research may be required to shift public opinion in favor of OER. Adding to the problem, the bulk of OER content is not rated in a consistent fashion or in a common forum. That means teachers have little evidence- either from respected authorities or fellow teachers- of OER effectiveness, and this results in OER being perceived as lower quality.

An additional barrier, which is beyond the Foundation's work at present, is that the expansion of OER is somewhat dependent on access to technology—specifically, access to devices and to broadband Internet service. There are instances of OER being used successfully in print format - for example, TESSA and Siyavula materials are used in print by hundreds of thousands of teachers each year across Africa. Even New

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[5] In the 2011 Babson survey, 59% of Chief Academic Officers at the higher ed level said they "agreed" or "strongly agreed" with the statement that OER "would be much more useful if there was a single clearinghouse." This pain point was also cited by K-12 teachers and OER ecosystem participants in the 2012 BCG work.

York City is printing thousands of copies of Expeditionary Learning's curriculum for use around the district. However, nearly all OER is created digitally and digital distribution is a positive aspect of the movement, in that it will allow consumption and modification to spread much farther than would otherwise be possible.

Through targeted investments, the Program intends to build and strengthen an OER infrastructure capable of overcoming these barriers. This infrastructure can be thought of in market economics terms.. The Program plans to push OER toward the mainstream by supporting a limited set of market-ready exemplars of high-quality supply for the most popular subjects and courses in K-12 and post-secondary education. In addition, the Program hopes to pull mainstream education toward OER, by encouraging the implementation of policies that support OER, while pursuing a research agenda that demonstrates improvements in teaching and learning and encourages OER adoption. Finally, the Program aims to help ensure that demand for OER is satisfied with quality materials by supporting the development of standards for usable and effective products.

2. WHAT WILL SUCCESS LOOK LIKE?

The future of OER and the goal and scope of investment

By 2017, the Education Program expects that OER will be increasingly integrated into the educational mainstream, improving the effectiveness of education at all levels throughout the United States and around the world. OER producers will supply high-quality, personalized instructional materials for the most basic subjects and most popular credit-bearing courses in K-12 schools and colleges nationwide. Key OER providers around the globe will be on a path to sustainability, receiving funding from governments, other philanthropies, institutions, and private sources. At the same time, OER will give millions of people opportunities to pursue their academic interests independently and for free.

The future: OER sustainably integrated into education

Over the next several years the Program would like to see widespread adoption of OER materials that improve teaching and learning. The Program's long-term vision, however, is for OER to become integrated into the education mainstream, delivering access to knowledge and improved teaching and learning and supported by a robust market. Currently, open resources have to be clearly marked and set apart because proprietary materials now dominate education at every level of learning—primary, secondary, post-secondary, and professional. In the coming decades, the Program hopes that distinction will lose its relevance as most educational materials become openly available, bearing open licenses so that anyone can reuse, revise, remix, and redistribute them.

Of course, even when open educational resources are provided free of cost to teachers and students, they are not truly free to produce. They must be developed and regularly revised, formatted, and integrated with other systems. We expect a combination of government, business and online communities of practice providing support for these processes.

In order for the movement to become sustainable, the Program envisions businesses- both for- and not-for-profit- providing OER to an educational marketplace shaped by governments, schools, teachers, and self-taught learners. As the largest purchasers of educational materials and services, public schools and governments, would provide the steady demand and revenue necessary to keep the OER market growing.

A number of possible business models could fund OER producers for the long run. Among them is a publishing model in which OER producers charge for print and electronic versions of their resources or charge a sliding access fee for use of sections of their sites. A services model, which yields revenue by providing professional development and lesson planning services for OER such as Expeditionary Learning, might also suffice. In addition, there is an accreditation model, in which online education institutions charge for certification of learning while providing a combination of OER and other courses for credit and degrees.

A few governments have already adopted open policies that require publicly funded education and research resources to be openly licensed,

citing the rationale that the public should have access to what they purchased. If governments shift to require educational resources purchased with public funds be open, OER sustainability could be much less of a challenge.

Each of these models relies in part on the creation of an OER market by government and institutional policies designed to open the door to adoption by schools and students within formal education systems.

Goal: Mainstream adoption of OER that improve teaching and learning

The Program's goal for its OER infrastructure investments in the next few years has two components: 1) to pave the way towards mainstream adoption of OER in a manner that promotes greater, sustainable educational capacity and 2) an increase in the effectiveness of OER from delivery of personalized educational experiences. These two goals are mutually supporting. The benefits of personalization will spur mainstream adoption, and mainstream adoption will increase the number of resources available that are available to be personalized.

GOAL:

Mainstream adoption will guarantee both widespread access and long-term sustainability, but it requires a steady supply of superior resources along with supportive policies and standards. The Program is considering investments to encourage formal adoption of OER by schools, students, and lifelong learners. In addition, it intends to invest in financially sustainable production and distribution by businesses, governments, and institutions.

Mainstream adoption of OER sustainably increases educational capacity

OER increase effectiveness by delivering personalized educational experiences

Personalized education will ensure that the OER movement delivers on the promise of openness in education. For example, open licensing makes it possible for OER to be translated into local languages quickly. In addition, OER can reduce the cost of textbooks and other educational materials to the point that copies can be distributed to every student every year in multiple digital formats and for less than $5 for each print-on-demand copy. Thus, as consumables, they can be freely annotated and updated.[6]

Measuring progress against this two-part goal will require the Program to increase the capacity of the OER field to track adoption and evaluate effectiveness. The movement will have moved into the mainstream once millions of teachers, educators, students, and self-taught learners are routinely using and producing OER and usage is continuing to grow. In the past year, the Program has made a significant effort to identify key

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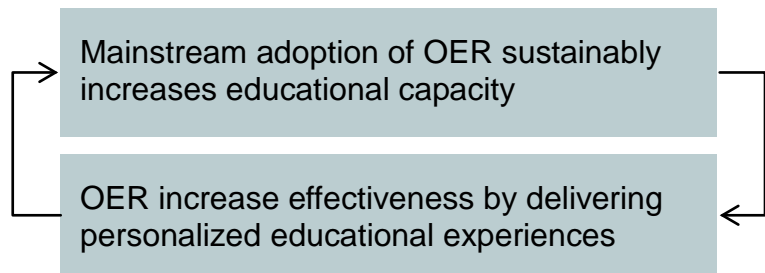
[6] In pilots of the Utah Open Textbook Project, open science textbooks were printed and distributed to students at a cost per book of approximately $5, compared to the average price of around $80 for a high school science book.

metrics and targets for measuring progress towards a healthy, mainstream OER ecosystem. They are discussed in Chapter 4.

These goals are ambitious, and will not be attainable by funding from the Program alone. As discussed in Chapter 4, the Program expects to work closely with co-funders and to engage public and private sources of capital in this undertaking.

Program scope: Build national leadership and pursue international partnerships to strengthen the OER movement worldwide

OER has always been a worldwide movement focused on learning from kindergarten through adulthood. Its ultimate goal is to increase access to high quality educational resources for everyone. Although many investments in OER infrastructure could possibly serve this global movement, the Education Program's budget limitations require it to target investments selectively.

The Program intends to continue to support groups that are leading national policy advocacy[7] and development efforts to build an OER infrastructure for K-12 and community colleges in the United States. These efforts will work together with the Program's new deeper learning strategy to develop partnerships with schools and districts that would be willing to serve as pilot sites for OER projects in deeper learning.

Internationally, the Program plans to pursue a narrow scope of investment that leverages partnerships with other Foundation programs, national and international bilateral and multilateral agencies, and philanthropies. By focusing on clear partnership opportunities with organizations that have significant reach and resources to support advancement in OER policies, the Program could make the most of its investments to help grow OER as a worldwide movement.

As with its deeper learning strategy, the Program will make its OER investments with underserved students in mind. Not only will the Program support openly-licensed, no-cost materials, but its investments also will focus on encouraging reuse of existing resources and reducing technological barriers. One goal will be to make new materials usable through openly-licensed software solutions with minimal hardware requirements.

Funding criteria: Free and legal to reuse, revise, remix, and redistribute

In order for OER to deliver on its potential, it must remain free and legal to use, revise, remix, and redistribute, as defined by the Creative Commons Attribution (CC-BY) license or by availability in the public

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[7] The Hewlett Foundation does not lobby or earmark its funds for prohibited lobbying activities, as defined in the federal tax laws. The Foundation's funding for policy and advocacy work is limited to permissible forms of support only, such as general operating support grants that grantees can allocate in their discretion, and project support grants for nonlobbying activities (e.g., nonpartisan research and public education).

domain. The Program anticipates investing in projects that meet these criteria. We also will invest in projects that:

- Employ formats that are usable, sharable, revisable, and remixable with free and open source software, with the most minimal hardware requirements possible;

- Offer accessibility to a diverse body of users;

- Follow standards developed by the OER movement to enhance discoverability, interoperability, quality, and accessibility;

- Align where possible with the Common Core State Standards in the United States; [8]

- Work together at the system level, reaching tens of thousands of teachers and millions of students;

- Augment research to understand the efficacy and outcomes of personalized education delivered by OER, as well as the impact of open licensing;

- Increase OER adoption and improve productivity; and

- Create OER that deliver demonstrably improved teaching and deeper learning outcomes

Potential risks to reaching mainstream adoption

While the movement builds upon its successes and pushes towards mainstream adoption, it also must recognize that outside forces could negatively affect progress. These risks include:

- **Lack of sustainable funding**. The movement's current reliance on private capital and philanthropic funding leave it exposed if current levels of support diminish significantly. This risk will decrease as OER's funding becomes more diversified as it moves toward a marketplace model, and as more governments adopt open policies that require publicly funded educational licenses be openly licensed.

- **Loss of public interest, awareness, and understanding.** Thanks to the movement's efforts, many educators are aware of OER. The recently increased investment in education technology, both open and closed, has brought additional attention to the movement. While there is ample opportunity for partnership with all companies and organizations looking to innovate and improve education resources, it also is possible that interest in OER could be overshadowed by the current

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[8] These are a common set of English language arts and mathematics K-12 standards that represent the knowledge and skills that high school graduates need to master to succeed in college and careers. They were developed by The Council of Chief State School Officers (CCSSO) and the National Governors Association Center for Best Practices (NGA Center) on behalf of 48 states, two territories, and the District of Columbia, and have been formally adopted in 42 states and the District of Columbia.

enthusiasm for and investment in educational technology—both open and closed[BC1] . Further, as more players enter the space and adopt elements of "openness" into their vision, the definition of "open" could be diluted. While the Foundation's OER definition continues to be the standard bearer by clearly stating "OER are teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others"[1], we are seeing a lot of confusion in the market about the terms "Open" and OER.   One example is the rise of massive online open courses (MOOCs) which have spurred a great deal of attention for the movement. However, most MOOCs interpret "open" as "open access," meaning that anyone can take the course for free, but they still put the content under very restrictive copyright. While moving from completely closed and proprietary courses to more open access courses is a significant first step in openness, it is important that Universities and MOOC providers move all the way along the Open continuum and actually release the course materials under an open license. It is false to think that one course can education the entire world. If we know anything about learning, it is that effective learning is highly contextualized and personalized. Open licensing of course materials in MOOCs and online courses unlocks the potential of large scale mass customization and adaptation to local contexts across community colleges, developing countries, other institutions, languages and many others. Open licensing also protects academic freedom by inviting educators to modify and improve resources for whatever their intended purposes and contexts are. It is important for the OER field to continue to work with institutions and organizations in the online learning world to make sure Open is understood as not just Open Access, but fully Open Sourced, otherwise OER may get lost in the details and lose ground.

- **Inadequate succession planning**. The OER movement could not have accomplished what it has to date without extraordinary support of so many early adopters and visionaries. Several of these trailblazers have become charismatic, passionate leaders of the anchor institutions that drive the OER movement today but it is unclear who will carry on their work in the future. Encouraging succession planning for the next generation of OER trailblazers is critical if the movement's momentum is to be continued.

Given the evolving nature of the OER ecosystem, as well as its existence within a broader educational landscape, other unforeseen risks could present themselves in the future. By continually evaluating the state of the ecosystem and its progress towards mainstream, as suggested in Chapter 4, it is possible to both monitor the above risks and identify new hazards when and if they arise.

3. WHAT INVESTMENTS ARE NEEDED TO ACHIEVE THIS GOAL?

Logic model and theory of change

The Program envisions investing in the infrastructure essential for achieving mainstream adoption of OER and transforming teaching and learning. This infrastructure must deliver a high-quality supply of educational content, promote supportive policies, and develop practical standards for OER materials and practices. The Program also plans to underwrite research to spur demand and guide production and to support opportunistic innovation to build a pipeline of new OER.
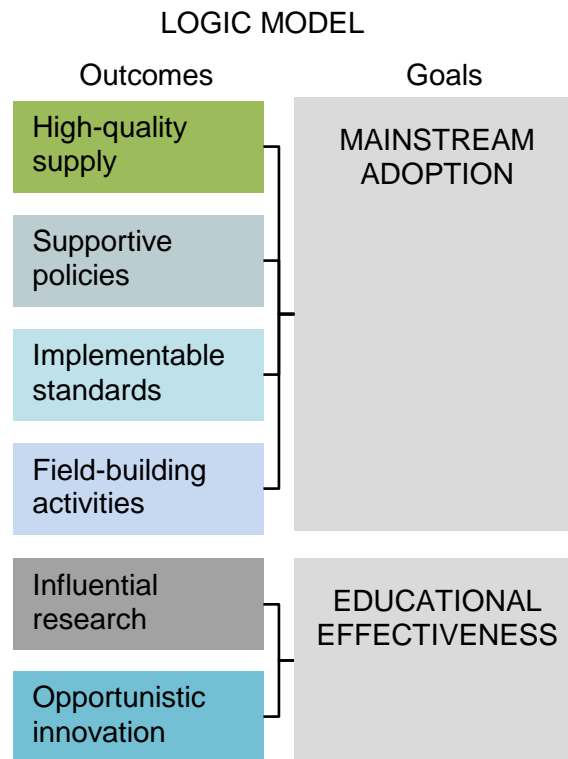
Logic model: A theory of change for mainstream OER that improve educational effectiveness

The Program's logic model represents a theory of change to achieve mainstream adoption of OER that improve educational effectiveness. By focusing on only the most critical barriers to adoption, the Program conserves its resources, so that it might also support new and innovative open education efforts.

While the Foundation cannot address all barriers to adoption, it will invest in overcoming the most pressing challenges. As discussed in Section 1, an uneven supply of excellent, easily adoptable OER currently relegates the movement to the margins of the education system. Incompatible policies limit the ability of schools to adopt OER and make it difficult for educators to participate in the movement. A lack of standards creates high variability among OER materials and makes them more difficult to find and use. And limited proof of effectiveness means that policymakers, administrators, and educators have yet to be fully convinced that OER are worth integrating into everyday use. In order to move past these obstacles, the community must be bolstered by field-building activities, influential research, and opportunistic innovation.

The barriers were identified through research, extensive interviews with experts, and the Program's own experience in the OER field. They have restrained the OER movement since its inception, and they are closely related to some of the challenges identified by the authors of the 2007 review of both the OER movement and the Foundation's OER initiative. [Atkins, Brown, and Hammond, 2007]

As shown in the basic logic model to the right, the Program's investments will directly tackle

LOGIC MODEL

Outcomes	Goals
High-quality supply	MAINSTREAM ADOPTION
Supportive policies	
Implementable standards	
Field-building activities	
Influential research	EDUCATIONAL EFFECTIVENESS
Opportunistic innovation	

these barriers, while reserving funds to support an innovative and sustainable ecosystem of OER. The Program will pursue six outcomes:

- High quality supply of OER for the mainstream;

- Supportive policies that remove restrictions on OER funding and implementation and that provide incentives for OER adoption;

- Implementable standards that guide OER development and increase discoverability, interoperability, and accessibility;

- Field-building activities and meetings that continue to strengthen and expand the OER community;

- Influential research to encourage demand and guide production; and;

- Opportunistic innovation to ensure OER adapts to new transformations in technology (e.g., mobile phones, tablets, MOOCs, etc.)

The Program has carefully considered the role of philanthropy in this work, and how it can use its budget and leadership role to deliver the largest benefits to OER and education. While the Foundation, and philanthropy generally, cannot sustain OER indefinitely, philanthropic investments can help create a vibrant marketplace for OER, which is essential to the long-term sustainability of the enterprise.

The Program's theory of change simultaneously addresses supply, demand, and quality to achieve the Program's goals. Working together, the Program's investments will help create a market for OER. The sections below discuss investment activities to achieve the six outcomes from the logic model.

High-quality supply

To date, the movement has focused opportunistically on content, which has led to an uneven distribution of materials across subjects occasionally concentrated on the periphery of the education system, such as Advanced Placement (AP) and credit recovery. To reach the mainstream, however, OER producers must provide high-quality resources, including textbooks and assessment items, for the core academic subjects in K-12 and post-secondary education. Moreover, these resources must be well-organized and packaged in such a way that it is easy for teachers to adopt, use, revise, and then contribute new resources back into the commons. While teachers that are early adopters are willing to put in the extra effort to use OER, in order to reach large numbers of mainstream teachers it is critical to make it easy and seamless for them to find and use OER just like other market products. While the Program plans to limit its investment in supply over the coming year, it may consider investments that would explicitly promote adoption, such as initiatives that focus on making market-ready products, and that would complement the Program's efforts to encourage

governments and institutions to support the development of high-quality supply.

- **GOAL: Supply of OER is aligned with the Common Core for schools, teachers, and students in K-12**. The adoption of the Common Core standards creates a unique opportunity for the advancement of OER that align with both the Common Core standards and deeper learning. First, the new standards will require the creation of new materials and will allow new content producers into the supply pipeline. If OER can meet this demand, they may have a chance to bypass the traditional state and district material adoption cycles that have mostly excluded OER providers to date. Second, the Common Core standards are under consideration at the same time that states and schools face severe budget pressures, so leaders may favor OER over proprietary content because they can substantially reduce costs. Finally, shared standards likely will encourage states to collaborate with one another on resource development; open licenses would provide a ready legal framework for these efforts.
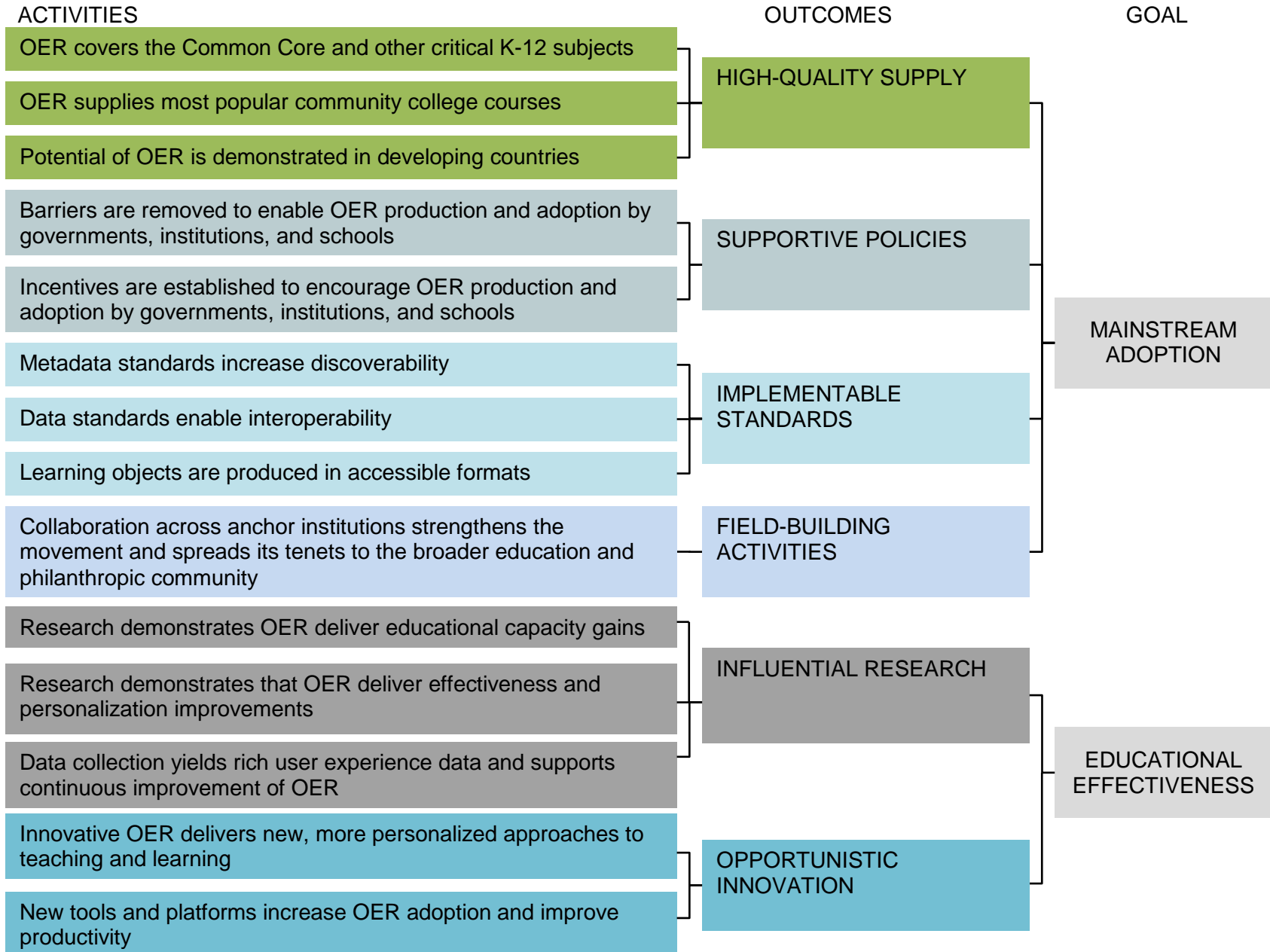
  Achievement of this goal would mark a significant shift in OER content production for K-12. Ultimately, the Program hopes to work with key partners to lead in funding, producing, and assembling existing content. Potentially, those partners could include states and districts that adopt the Common Core standards, as well as for-profit producers.

- **GOAL: Support production of basic content for the twenty most popular community college courses**. The focus on community colleges reflects the Program's commitment to improve education for underserved students. In addition, because textbooks represent a significant percentage of the total cost of enrollment, community colleges and their students are especially sensitive to the price of textbooks which may enhance the demand for OER.   Finally, textbooks produced for the community college market are highly adaptable, as they can be used both in advanced high school classes and in introductory courses at four-year universities.

- **GOAL: Pursue limited, high-impact, international partnerships to produce and distribute OER in developing countries and demonstrate the movement's potential.** For example, the Program will look for opportunities like one found in Nigeria, where the government has invested in distributing print versions of open materials produced by Teacher Education in Sub-Saharan Africa. In this case, government support of the work allowed it to reach large scale without significant philanthropic investment. The Program also may partner with other philanthropies to produce high-impact OER and to revise existing resources for local contexts.

  While limited, these investments are intended to prove that OER can satisfy the significant demand for educational content and materials in developing countries as well as in the United States. In the long run, they are intended to encourage governments and

international funding agencies to invest independently in OER as
a means of increasing educational capacity around the world.

DETAILED LOGIC MODEL

ACTIVITIES	OUTCOMES	GOAL

ACTIVITIES

- OER covers the Common Core and other critical K-12 subjects
- OER supplies most popular community college courses
- Potential of OER is demonstrated in developing countries

- Barriers are removed to enable OER production and adoption by governments, institutions, and schools
- Incentives are established to encourage OER production and adoption by governments, institutions, and schools

- Metadata standards increase discoverability
- Data standards enable interoperability
- Learning objects are produced in accessible formats

- Collaboration across anchor institutions strengthens the movement and spreads its tenets to the broader education and philanthropic community

- Research demonstrates OER deliver educational capacity gains
- Research demonstrates that OER deliver effectiveness and personalization improvements
- Data collection yields rich user experience data and supports continuous improvement of OER

- Innovative OER delivers new, more personalized approaches to teaching and learning
- New tools and platforms increase OER adoption and improve productivity

OUTCOMES

- HIGH-QUALITY SUPPLY
- SUPPORTIVE POLICIES
- IMPLEMENTABLE STANDARDS
- FIELD-BUILDING ACTIVITIES
- INFLUENTIAL RESEARCH
- OPPORTUNISTIC INNOVATION

GOAL

- MAINSTREAM ADOPTION
- EDUCATIONAL EFFECTIVENESS

Supportive policies

Supportive policies are crucial to achieving sustainable, mainstream adoption because they will spur the use of OER in traditional classrooms, in addition to OER production by governments, institutions, and educators. The Program expects to support advocacy efforts in two categories: the lowering of policy barriers to OER, and the development of new policies that create incentives for OER adoption and production. The former might involve, for example, broadening textbook adoption practices; the latter might include considering OER production, re-use, and research as a factor in faculty tenure decisions. Advocacy efforts could be targeted at institutions of higher learning as well as at governments in the United States and abroad.

There are two particular policy barriers that impede OER adoption and production by governments and institutions. The first set involves material adoption policies. Among these are state and country policies that require publishers to pay for review by public agencies, a barrier for non-profits that offer OER free of charge. Many U.S. states also have long adoption cycles that bar the adoption of new materials for several years, slowing innovation and delaying OER implementation. Moving states to digital resource and curriculum adoption can help break down some of these traditional barriers. Internationally, a variety of policies limit OER use, including requirements that materials be available in all local languages—which OER rarely are—before they can be officially adopted anywhere.

The second barrier relates to licensing of content created by educators. Many states and schools do not have clear policies guiding teachers about the legal licenses that they should apply to materials they are producing in their everyday work. In Utah, OER supporters pressed the state board of education to issue specific guidance for the application of Creative Commons licenses to the materials teachers produce for their classrooms. Similar efforts across the world could help educators graduate from informal sharing of content with colleagues to widespread digital distribution of OER.

Incentives to increase the adoption and production of OER include:

- **GOAL: Policies that favor applying open licenses to content developed with public funds**. Many governments fund the development of new content, but allow that content to carry restrictive licenses that limit its distribution and revision. Applying an open license to some, if not all, of these publicly funded materials would create a strong incentive to publishers and curriculum developers to produce OER in order to receive government support.

- **GOAL: More states have digital curriculum adoption policies.** In order for digital learning and OER to grow in mainstream K12 education, states need to move from once every seven year textbook adoption policies to policies that support the adoption of digital resources and in turn OER.

- **GOAL: Policies that include OER in professional development and teacher education programs**. In primary and secondary schools, teachers could be given professional development credit for participating in OER-related training or communities of practice. In addition, including OER in teacher education programs could result in higher rates of OER use by new teachers in their classrooms.

Implementable standards

Standards have the potential to make it easier to find and use OER, increasing the potential for mainstream adoption. Past investments in new standards, such as the Program's support of Creative Commons licensing for OER, established openness as a legally viable concept and allowed the movement to grow into what it is today. Relatively easy implementation was crucial to the advancement of current OER materials. Similarly, investing in metadata, data, and learning object standards[9] that are as easy and inexpensive to implement as possible will be crucial to the next phase of the movement's growth.

- **GOAL: Build on de facto metadata standards**. The focus should be on developing a common vocabulary to tag and describe OER and on encouraging the collection of relatively low-cost, high-benefit metadata (like site maps) to improve discoverability. Metadata provides necessary context beyond what can be gathered from the full-text search provided by Google and Yahoo. For example, metadata can communicate the specific state standards that a lesson meets or the age groups that it serves. The Learning Registry Metadata Initiative is working with the three large search engines to establish a baseline metadata standard for education to make OER easier to find.

- **GOAL: Help establish and pilot new data standards for OER**. To achieve the best production, research, and outcomes, OER-related data need to be accessible and readable across multiple platforms. So far, existing data standards have failed to reach the level of scale that would allow the benefits of interoperability—such as data about OER to be able to be used on multiple different platforms. Currently, it's difficult for OER suppliers to gather data about how their materials are being used, who is using the resources, and what changes have been made. With access to this type of data, suppliers could make significant improvements to their OER. The Program would support research that leads to greater cross-platform collaboration and reach of OER. This could include getting more OER platforms to integrate with the Federal Learning Registry initiative which is attempting to achieve this goal.

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[9] A learning object is "a collection of content items, practice items, and assessment items that are combined based on a single learning objective" Source: http://en.wikipedia.org/wiki/Learning_object, April 8, 2011.

- **GOAL: Support the adoption of accessible learning object formats[10] that can significantly increase accessibility to high-quality OER**. Because materials used in public schools are legally mandated to be reasonably accessible to students regardless of their physical abilities, they must frequently be modified to suit different needs. OER has an advantage over proprietary content in this area, because the open license allows anyone to modify the material for accessibility. If learning object formats can automate accessibility (for example, compatibility with screen-reading software for the visually impaired), these OER materials may become accessible to a much broader audience than proprietary materials.

Field-building activities

Overcoming these barriers to mainstream adoption is no small task; fortunately, it is a challenge that the Foundation faces with a number of strong partners and grantees. By enabling collaboration across key players in the space and reaching out to the broader education and philanthropic community, the Foundation can maximize the effect of its own investments, ultimately reaching the goal of mainstream adoption.

- **GOAL: Foster collaboration and broader enthusiasm for the movement.** The Program has continually sought to enable collaboration across its grantees, both formally and informally, and it will continue to do so going forward. Similarly, it will continue to fund anchor institutions that drive the movement forward and to reach out to other institutions and foundations that are interested in learning more about OER in order to broaden the field.

Influential research

While the main priority of the Program's research agenda is to overcome the barrier of a lack of evidence surrounding OER's effectiveness, it also aims to measure the potential of OER to personalize education. The proposed agenda would include three components: research to document the economic, social, and educational benefits of OER; research to influence the design of OER in order to improve its effectiveness and capacity to be personalized; and research to strengthen the data infrastructure.

- **GOAL: Evaluate the educational capacity gains delivered by OER**. As discussed in Section 1, the United States' education system must do more with less funding; OER can help increase its capacity to do so. Specifically, it can help increase students' access to educational resources and help teachers assess and assist student learning. The Program intends to invest in research to evaluate the educational capacity gains OER can

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[10] This refers to learning objects that are designed "to enable inclusive access to personally relevant, engaging learning opportunities for the full diversity of learners and content producers." Source: http://floeproject.org/

deliver. This will include researching demonstrations of how OER can support equal or better learning gains on assessments at a far lower cost.

- **GOAL: Measure the effectiveness and personalization gains delivered by OER**. Effectiveness gains attributable to openness of education are difficult to measure in both K-12 and higher education, since studies must isolate and evaluate how openness contributes to learning. Researchers within the OER movement argue that OER can deliver unique pedagogical benefits through personalization. For example, open textbooks can be customized for a student's literacy level. At Leadership Public Schools in Oakland and Hayward, teachers customized open textbooks to incorporated literacy supports within algebra and science materials for their students.

- **GOAL: Strengthen the data collection infrastructure**. The Program plans to continue to invest in the OER movement's data collection infrastructure, so that it can track and report its progress to the wider field of education. The Program has already helped many of its grantees collect detailed user data through Google Analytics. As research identifies capacity and personalization gains, the Program also proposes to help grantees and other OER organizations track their own successes. This could include establishing better ways to capture learning outcome data as opposed to just web analytics data. If the Program can help strengthen and automate data collection and feedback processes, the movement could accelerate efforts around the continuous improvement of OER which is critical to OER's success in the future.

Generally, the Program will not support research into individual sustainability models, leaving business plans to prove themselves sustainable by succeeding or failing in the marketplace. The Program believes it can best support OER's sustainability by encouraging its grantees to build sustainability plans into their grant applications and by pursuing an advocacy agenda that spurs OER demand.

Opportunistic innovation

Innovation is expected to create additional forms of OER that will be more attractive to formal and informal users alike and that can deliver larger productivity and effectiveness gains than less sophisticated materials. These new forms could include open online courses with integrated cognitive tutors, open participatory learning, open personalized learning environments, and other groundbreaking tools, platforms, and content that could increase the rate of OER adoption.

- **GOAL: Invest in innovative forms of OER as opportunities arise**. As open textbooks and other basic OER materials mature, become sustainable, and are moved into the mainstream, the Program could help advance new forms of OER. These might be new forms of OER that might be too risky and speculative for private capital to invest in, but that could nonetheless provide significant benefits to the field.

- **GOAL: Explore new tools and platforms to increase the rate of OER adoption**. In addition to continuing to build the OER ecosystem, the Program may explore new ways to grow OER that keep up with new trends in the field. This could include supporting new ways to demonstrate the power of openly licensed MOOCs. The Program will invest in innovative tools and platforms that can dramatically increase the rate of OER adoption and efficacy.

4. HOW WILL THE PLAN BE IMPLEMENTED?

Outcome-based budget, metrics and targets, and funding plan

In the future, the Program hopes to be able to continue investments in OER in close cooperation with other funders. Over time, the Program has shifted its spending priorities from an early focus on supply and small-scale proof points to a strong push for policy change and new standards adoption, while maintaining a level of funding for innovation throughout. The Program will continue to refine a set of outcome-focused metrics and targets to track its progress and the evolution of its priorities.

Outcome-based budget

Budget priorities will shift over the next several years as the Program pursues three phases of investment in the elements of the logic model.

- **Encouraging high-quality supply (2013).** The Program previously focused on creating basic content for higher education and K-12, with an emphasis on open textbooks since that format was ready to be introduced into the education mainstream on a significant scale. Given progress in this arena, the Program will be ramping down its investment over the course of the year, and will be looking to partners and other funders to help fill the existing gaps in the content supply. After 2013, it will consider targeted investments that aim to make the existing OER more easily adoptable by making them market-ready, for example by packaging or aggregating content or adding assessments to OER, but will focus most of its investment on supportive policies, standards, research, and innovation.

- **Encouraging adoption through supportive policies, implementable standards, field-building activities, and research (2014-2016).** During this period, the Program wishes to see widespread adoption of OER by public education systems and consumers. In pursuit of this goal, the Program plans to sustain its allocation toward raising OER awareness, advocating supportive policy--especially new adoption policies designed to increase support for OER--and supporting more OER champions.

- **Innovating (2013-2016).** Throughout 2013-2016, it will remain important for the Program to continue to support new, innovative OER materials that expand the frontiers of educational technology. By 2015, the Program expects that the field will have developed metrics of effectiveness and will have a better understanding of how to improve the quality of OER.

The Program has used expert recommendations and additional research to set priorities for investment across the various outcomes over time. As appropriate, it will also analyze the expected return on investment in

each outcome to ensure that investments are effectively allocated among the components of the logic model.

In addition, the Program plans to evaluate the social return of individual investments within each category of outcomes. This approach will ensure that comparable grants are evaluated together and that the Program advances each outcome as effectively as possible.

Metrics and targets: Measuring evolution of the OER ecosystem

The Foundation's ultimate goal is to equalize access to knowledge for teachers and students around the globe and improve the practices of teaching and learning through OER. To reach this goal, the Foundation must pave the way towards a healthy, self-sustaining OER ecosystem marked by strong teacher usage and engagement, fueled by a supply of high-quality materials held to common standards, and supported by a friendly policy environment. To understand progress towards this end, the Program intends to track in-classroom adoption, as well as key factors leading to adoption. At present, most of the specific metrics outlined below are focused on U.S. adoption, though the Program is also tracking a few high level metrics of OER policies and adoptions around the world.

First and foremost, the Program is directly tracking progress towards its goal of mainstream adoption by measuring the percentage of K-12 educators that are using OER as their primary teaching materials. In the United States, that number currently stands at 10%. [BCG, 2012].

Measuring adoption alone, however, does not provide a deeper understanding of the state of the OER ecosystem. Tracking factors leading to adoption, which span supply, demand, and policy, will help uncover more specific insights on how the ecosystem is progressing and which barriers to mainstream adoption remain.

- **Demand factors.** In order for teachers to use OER as their primary materials, they must know about OER and be permitted to use it. Teacher awareness, which can be tracked by surveys, and the acceptance of OER on state adoption lists are therefore leading indicators of adoption. Once adoption takes off, a community of contributors who review, update, and add new content will ensure that the supply base is continually improved and that adoption continues to grow. Measuring community feedback will help gauge the depth of engagement and the likeliness that demand will thrive.

- **Supply factors.** Teachers need to perceive OER materials as high-quality and as more effective than traditional, proprietary materials before they will consider using them in their classrooms. But excellent material alone is not enough to lead adoption: OER supply must be plentiful enough to cover all major subjects, it must be organized in repositories against common standards that make it easy to find, and it must be packaged in a way that allows off-the-shelf usage. Progress along these core supply dimensions—perceived quality, OER coverage across

subjects, discoverability, and product availability—would indicate that supply is improving and becoming more user-friendly.

- **Policy factors.** Supportive policies are critical for ensuring a sustainable ecosystem. Unfriendly material adoption policies and the lack of clarity around ownership of educator-generated content are currently the two largest policy barriers. Looking at, for example, the number of states that have put into practice OER-friendly policies or that have passed guidelines that encourage teachers to apply open licenses to the materials they have made would indicate that progress is being made.
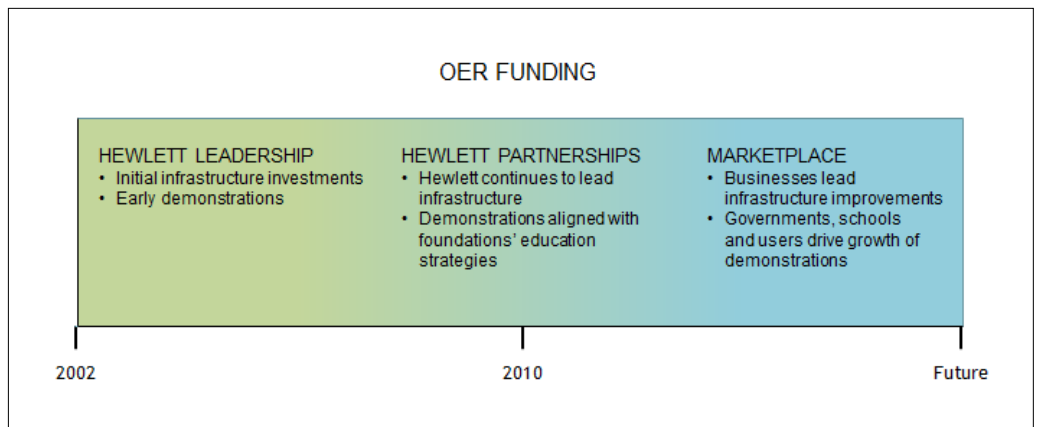
Taken together, these factors are intended to give a clear picture of the overall OER ecosystem in the United States and the incremental progress towards mainstream adoption. This evaluation will not only provide an understanding of the level of teacher adoption and engagement, but also will shed light on which parts of the ecosystem are succeeding and which may be in need of additional attention. Measuring the factors will also help identify risks as they begin to manifest themselves.

Tracking specific factors leading to adoption also will help the Program understand the impact of its efforts to improve and promote OER's educational effectiveness. While effectiveness is absolutely central to the success of the movement, it is not sufficient in and of itself to advance adoption: even after OER is shown to improve learning, that research has to be disseminated to the mainstream group of educators. If OER is proven effective—and teachers believe this—then the movement will have made significant strides toward adoption. Teachers' perception of quality, then, becomes a critical metric for understanding educational effectiveness and its end goal.

Within the United States, the Program intends to track adoption as well as the subset of key ecosystem factors that are most in line with its U.S. investments. Given its narrower scope of investment internationally, the Program will take a different approach to measuring impact outside of the United States, focusing instead on the number of countries that have adopted OER-friendly policies.

Funding plan: Engaging philanthropic and public funding partners

When the Program began its OER initiative in 2002, the Foundation was the primary funder for building the movement's infrastructure and demonstrating its potential. Today, the Program often works with philanthropic partners and envisions a time when the marketplace will play a strong role in the field. If OER is to become sustainable, the funding landscape must shift to a broad, healthy ecosystem of funders, including governments,

OER FUNDING

HEWLETT LEADERSHIP
- Initial infrastructure investments
- Early demonstrations

HEWLETT PARTNERSHIPS
- Hewlett continues to lead infrastructure
- Demonstrations aligned with foundations' education strategies

MARKETPLACE
- Businesses lead infrastructure improvements
- Governments, schools and users drive growth of demonstrations

2002   2010   Future

businesses, and communities of users.

While the Hewlett Foundation continues to lead investment in OER infrastructure, it plans to rely increasingly on philanthropic partnerships to fund high-quality supply and demonstration projects. In addition, the Program will look for opportunities to partner on infrastructure investments, though these may be limited.

As the OER movement crosses the chasm that separates early adoption from mainstream use, it is expected to move to a marketplace model, with governments and individuals as the customers for educational materials and service. Businesses, governments, and non-profit organizations will invest in the infrastructure and expansion of the market by underwriting the policy advocacy, research, and standards work necessary to increase the demand for, and quality of, OER.

In the long run, the role for philanthropies should recede as openness becomes commonplace in education. Eventually, philanthropies will engage in OER development in the same way they support the development of other pedagogical and educational materials today-by furthering innovative and risky new resources. Just as the Hewlett Foundation is now supporting the development of educational materials—especially OER—that deliver deeper learning, other foundations will support OER that push the boundaries of educational practice in ways that are too risky or speculative for businesses.

We recognize that there are many challenges on the road ahead and this white paper seeks to tackle some of the most formidable barriers head-on. However, we also recognize that there may be unexpected roadblocks, as well as unforeseen opportunities. The OER movement always has been a community-driven venture. Our hope in publishing this white paper is to harness the expertise and energy of the OER community to ignite a deeper conversation about the future of OER, the role of OER in transforming teaching and learning, and the Hewlett Foundation's role within the OER ecosystem.

PRELIMINARY METRICS AND TARGETS

HIGH-QUALITY SUPPLY
- 80% of aware educators view quality of OER as on par with traditional publishers' content
- 80% OER coverage of K12 English/language arts and mathematics and middle and high school science sequences

SUPPORTIVE POLICIES
- 25 states fully open to digital providers [proxy for openness to nontraditional sources]
- 50 leaders successfully advocating for open policies globally
- OER policies continue to increase in number and breadth around the world

IMPLEMENTABLE STANDARDS
- 3-5 flagship OER platforms and producers adopt common metadata, data and learning object standards
- 80% of educators believe that OER is easy to find and integrate into their classroom

INFLUENTIAL RESEARCH
- Research demonstrates the productivity gains delivered by OER
- Research demonstrates that unique pedagogical properties of OER deliver learning gains (e.g., student performance on state assessments improves due to teacher revision of OER)

OPPORTUNISTIC INNOVATION
- 3-5 innovative OER tools, platforms, and approaches deliver more effective teaching and learning or increase the rate of adoption

MAINSTREAM ADOPTION
- 20 – 25% of U.S. educators use OER as primary material at K-12 and higher ed levels
- 2 – 3 "bellweather" U.S. adoption states include OER in approved K-12 materials list
- 20 large U.S. state systems have shown interest in OER (i.e., undertaken an initiative) at the higher ed level
- 10 countries have two or more initiatives that prioritize OER, half of which are developing countries

EDUCATIONAL EFFECTIVENESS
- Open textbooks and other open materials covering at least 3 major subjects measurably increase educational capacity or personalization in US K-12 schools (e.g., equivalent performance on state assessments at lower total cost)
- Innovative OER covering at least 2 major subjects (e.g., open participatory learning, cognitive tutors) deliver personalization gains in both formal and informal contexts
- 50% of educators are very aware of OER

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