

# The Middle School Portal 2: Math and Science Pathways, National Science Digital Library: Early Sustainability Planning for a Grant-Funded Digital Library

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www.msteacher2.org



The Middle School Portal 2: Math and Science Pathways project (MSP2) aims to provide middle school teachers with high-quality materials they can use in the classroom, and to foster greater sharing and communication within the middle school teaching community. The original Middle School Portal was a prototype for the 'Pathways' projects funded under the umbrella of the National Science Digital Library (NSDL), and MSP2 remains today entirely funded through NSDL. But the project faces a challenge: how will it cover the costs of operation and development when its current three-year grant runs out in 2011? This case study examines how the leaders of MSP2 are planning for the long-term sustainability of the resource. First, they are exploring a range of revenue-generating activities that build on current strengths of the partner organisations involved in the project; second, they are considering a 'plan B' of building a community-run site that would rely on a free social networking platform, the technical infrastructure of NSDL, and user-generated content – a site that its leaders hope could function even with limited staff.



This case study was researched and written by Kate Wittenberg and Nancy L. Maron as part of the Ithaka Case Studies in Sustainability project.

## Introduction

Since 2000, the National Science Digital Library (NSDL) programme sponsored by the National Science Foundation (NSF) has funded over 200 projects to create collections, services, and tools for teachers and learners at all levels of math and science education. As the Library's content grew, users reported having difficulty finding relevant resources within it, and so in 2003 NSF developed the idea of 'Pathways' – portals to the overall NSDL site that would be curated by different communities to improve the selection, annotation, and discoverability of NSDL resources.<sup>1</sup> NSF has continued to fund the NSDL programme and is currently considering the latest round of proposals for new Pathways grants, which will be awarded in the autumn of 2009.<sup>2</sup>

In 2002 NSF created a 'Core Integration' group to support the smaller, individual NSDL projects by providing central functions including technology, access management, and outreach. In addition to providing these shared services to projects under the NSDL umbrella, this central services group was also asked to help identify gaps in the content, tools, and functionality of the overall NSDL collection. The Middle School Pathway owes its existence to the Core Integration group, which in 2004 decided to use a portion of its own budget to fund Professors Len Simutis and Kimberly Lightle at The Ohio State University to create a portal designed to help middle school teachers.

The self-stated goal of the original NSDL Middle School Portal (MSP) was to add value to the larger body of content in the overall Library by offering "a middle school view into excellent online materials" drawn from both within and beyond projects funded by the NSDL initiative. By selecting and annotating online materials for inclusion in MSP, Lightle sought to capitalise on the promise of the NSDL by providing middle school math and science teachers with easy access to superior digital resources and teaching tips for important or challenging topics. Project staff members were responsible for reviewing available teaching resources for middle school science and math, selecting and annotating those materials, and uploading metadata records to the NSDL data repository, thus making the resources discoverable through both the NSDL site and MSP. Going beyond the mere provision of links to resources, MSP staff developed special Explore in Depth (EID) units to provide grade-level-appropriate guidance to teachers on subjects ranging from algebra and geometry, to rocks and minerals, to global warming.

1 NSDL Pathways cater to specific audiences, as defined by educational level, discipline, or resource or data type, and they enable users to more easily navigate and make sense of the wealth of resources that are part of the overall NSDL structure. Today, Pathways exist for community colleges and technical schools, the biological sciences, chemistry, physics and astronomy, computational science, computer science, engineering, materials science, mathematics, middle schools, the social sciences, informal science education, and multimedia resources.

2 The 2009 NSDL grant proposal solicitation can be found here: [www.nsf.gov/pubs/2009/nsf09531/nsf09531.html](http://www.nsf.gov/pubs/2009/nsf09531/nsf09531.html)

In 2005, with the original Middle School Portal already up and running, Lightle applied for NSF funding for a 'next generation' Pathway for middle school science and math teachers, but she was turned down. According to Lightle, her 2005 grant proposal 'lacked this whole idea of sustainability. There was no professional organisation or university who said they would work with project folks at the end of funding to make sure the project would continue.... We did not have that'.<sup>3</sup> She reapplied two years later, this time with co-principal investigators at two partner institutions, the Education Development Center (EDC) and the National Middle School Association (NMSA) – and received funding in September 2008.

The current grant is funding the next generation of the NSDL Middle School Portal – now called MSP2 – as an NSDL Pathway. MSP2 still seeks to serve as a reference source for the community, as did the previous site, but it also takes advantage of digital tools that allow for users to participate in the process of resource creation and knowledge sharing. The original MSP site is still maintained, but it encourages users to 'Connect with Colleagues' through the MSP2 social networking site.<sup>4</sup> Lightle feels that the participation of EDC and NMSA was a critical factor in securing funding, and that the integration of digital tools to develop content and support community building represents the 'next level of evolution of digital libraries'.

Yet as an entirely grant-supported initiative, MSP2's particular sustainability challenge is quite clear: its leaders must identify funding sources to support the continued development and maintenance of the MSP and MSP2 sites and all of their content, including blog posts and wiki pages, after their Pathways grant ends in 2011.<sup>5</sup> This case study will explore the core elements of their strategy: the partnership model with NMSA and EDC, including the options for revenue generation that these partnerships may facilitate; the leaders' plans for developing a robust user community that will not only use but contribute content to the social network, blog, and wiki space; and the project's relationship to the larger NSDL infrastructure.

## Sustainability model

### Goals and strategy

The original NSDL Middle School Portal was designed to be a digital library of exemplary middle school teaching materials that would include a browsable collection of catalogue records, plus 'Explore in Depth' publications that would contextualise the resources in the MSP collection. Based on the model of a 'first-generation' digital library, the collection is used by teachers seeking materials to use in their classrooms. In the year before MSP2 was funded, MSP had over 300,000 visitors. MSP2 moves beyond MSP's passive, text-based model of a digital

library to include Web 2.0 tools such as blogs, wikis, Diigo,<sup>6</sup> and social networking software. Unlike the original MSP site, MSP2 is designed to promote the creation, modification, and sharing of resources and to facilitate collaborative professional development among users. Its core feature is a Ning-based social networking component; once registered with MSP2, teachers can create their own pages, join interest-based community groups, and post to the site blog. All MSP content, such as the Explore in Depth units created for that site, is also accessible through the MSP2 site.

In their Pathways grant proposal, MSP2 project leaders identified a number of possible sustainability strategies, most of which involve building on initiatives already in place at partner organisations NMSA and EDC. Among these are fee-based educational workshops and webinars, digital publishing opportunities, and the instituting of fees for access to selected sections of the site. Lightle has also mentioned the possibility of applying for additional grants to support both new and ongoing work on MSP2. The original plan for sustainability calls for researching and investigating possible e-commerce and sponsorship opportunities in Year One of the three-year grant, and continuing to research and pilot e-commerce activities in Year Two. Goals for Year Three are to reach agreements with sponsors and 'launch an e-commerce model for selected MSP2 features and services'.

At this stage, however, MSP2 project leaders have not defined how much supporting revenue these models would need to – or be able to – generate. Rather, Lightle and her partners have been exploring what could be characterised as a backup plan that would depend for its success on three key assumptions: 1) that the community of middle school teachers using MSP2 will remain sufficiently committed to contributing content and tools to MSP2 to ensure the site's continued relevance and vitality; 2) that the project's relationship to NSDL will mean that the MSP2 site can remain on the central NSDL technical platform at Cornell University, its technological infrastructure secure; and 3) that the project leaders can identify one or more new partnerships willing and able to provide long-term solutions (for hosting and/or developing content) once the grant period ends. Should these conditions be fulfilled, project leaders hope that MSP2 could be sustained even without e-commerce revenue streams, perhaps with new content added to the site at a significantly slower pace, and relying on just those tools and functionality available through the central NSDL technical services group.

### Costs

The MSP2 is funded for the period 2008–2011 through an NSF grant of \$2,369,699, of which \$1,026,200 covers salaries and benefits for the equivalent of ten full-time staffers (10 FTEs), located at the partner institutions as well as at the Ohio Evaluation and Assessment Center for Mathematics and Science Education at Miami University of Ohio. Staffing at The Ohio State University, the lead partner institution, accounts for 5 FTEs and includes the lead PI at 50% and time from three math and science content specialists, an editor, and a website developer. Staffing at the Education Development Center adds up to 3 FTEs; this total includes a co-PI at 30% and time from two research assistants and a technology associate. The National Middle School Association, tasked with outreach and sustainability planning for MSP2, devotes just 1.50 FTEs,

<sup>3</sup> Unless otherwise noted, all quotations from staff members and other individuals knowledgeable of or associated with MSP2 are drawn from interviews conducted as part of this case study between March and June 2009. A full list of interviewees is included in Appendix A.

<sup>4</sup> [www.msteacher2.org/page/about-1](http://www.msteacher2.org/page/about-1)

<sup>5</sup> In 2008 NSF put in place a programme called Pathways II, which is designed to assist existing Pathways in their continued development after the end of their first grant. The program solicitation reads: 'Projects in this *Pathways* track will have accomplished the major stewardship goals set out above for an identifiable audience of learners, and would use Stage II support to ensure the expansion and stability of the original *Pathways* effort'. Assuming that this funding track is continued, it is possible that MSP2 could apply for one of these additional NSDL grants. But securing a Pathways II grant would not in itself provide long-term sustainability for the project; it would merely extend the amount of time available to the project leaders to seek other funding sources.

<sup>6</sup> Diigo is a web research tool and a social information network; see [www.diigo.com](http://www.diigo.com).

including a co-PI at 25%, an e-learning project manager at 25%, and a content management specialist at full-time. In addition, staffing includes 0.5 FTE at the Ohio Evaluation and Assessment Center (a co-PI at 10% and a senior researcher at 40%). Overall, the budget is weighted toward personnel with expertise in developing new content for the site. While some of the activities of current staff are likely to be specific to the start-up phase, other activities, such as site moderation, are likely to be needed on an ongoing basis.

Other non-staff-related costs include travel for PIs and other staff to attend meetings to present MSP2 to potential users and at the annual NSDL All Projects meeting, stipends for the Teacher Leaders (described below), some equipment costs, and indirect costs for each partner's university or organisation. As a condition of its grant, the MSP2 project is also required to allocate 15% of the total grant funds to the central NSDL Technical Network Services, which provides hosting, tools, and technical support to all NSDL grant-funded projects.

## Key factors influencing the success of the sustainability model

Creating a team of three institutions and the evaluation center was instrumental for receiving a Pathways grant in 2008, according to the co-leaders of the project. Each partner institution contributes particular areas of expertise to the endeavour: the team at Ohio State is responsible for editorial content of the site; the National Middle School Association is charged with identifying and training Teacher Leaders and providing outreach on behalf of the site to the NMSA membership of 200,000+ educators; the Education Development Center is responsible for creating student-designed interactive learning tools; and the Ohio Evaluation and Assessment Center for Mathematics and Science Education serves as an external evaluator, gauging the extent to which the project meets its overall goals. Sections below highlight how the contributions of each partner support the project's overall sustainability strategy, how the project attempts to understand its users, and the project's relationship to the NSDL as a whole.

### Building the user community: The National Middle School Association team

In focusing on a specific audience – middle school math and science teachers – rather than on a single discipline, MSP2 differs from most of the other NSDL Pathways. Indeed, one of the core features of the sustainability plan for MSP2, according to Lightle, is engaging the target audience of middle school math and science teachers as both contributors and users. By developing a robust community of educators who use and share the materials on the site, the project's leaders hope that MSP2 will become something users rely on and feel committed to in the long run. Co-PI Mary Henton of the National Middle School Association says that her own vision for the social networking site is to see 'groups formed around specific topics, around specific areas of interest, ongoing conversations; people actively sharing ideas and resources, teachers volunteering or offering to teach a session to another teacher's students, for example, through conferencing or Skype...'. Henton sees the community itself as the key to the ultimate sustainability of the site. She envisions 'a flurry of different types of activities that are rolling ahead and managed by the members of the community [so that] the active presence of those who are designated as co-PIs would [eventually] fade into the background'.

To this end, the MSP2 team at NMSA, led by Henton, is responsible for creating and mobilising a cadre of Teacher Leaders, who are recruited and offered an annual stipend of \$1,000 to help create content, welcome new visitors to the social network, stimulate community involvement and contributions through the blog posts and discussions, and lead web-based professional training seminars. By recruiting and educating others to use the social networking site, the Teacher Leaders are in many ways the primary driver for developing this community.

The plan outlined by the MSP2 leadership team in their 2008 NSDL grant proposal calls for an initial group of ten Teacher Leaders to:

- Cultivate and facilitate at least one MSP2 virtual learning community
- Actively recruit and engage new participants in the learning community
- Contribute to the development and refinement of MSP2 curriculum resources
- Participate in at least two professional development activities
- Attend a one-day symposium at the NMSA annual conference
- Present or facilitate at least one live event (eg, webinar, NSDL brownbag)
- Assist in identifying and screening the next group of Teacher Leaders<sup>7</sup>

And yet in the first nine months of the grant, results of the Teacher Leaders initiative have been mixed. According to Lightle and Henton, at least three factors have hampered the Teacher Leaders' ability to have an impact on MSP2. First, the project leaders have had difficulty recruiting Teacher Leaders: as of June 2009, only three of the ten budgeted positions have been filled. This is in part due to cutbacks at the National Middle School Association that have decreased the amount of time and attention NMSA staff have been able to devote to recruiting the Teacher Leaders.

Second, the Teacher Leaders who have been recruited may be finding elements of their tasks overwhelming. According to Henton, the problem is not a technical one; all of these teachers are proficient with web-based technologies. Rather, Henton fears that the Teacher Leaders may simply feel 'overwhelmed', wondering where to start in their efforts on behalf of the site when faced with so many choices and the competing needs of their busy schedules.<sup>8</sup> With so much content and so many possible places to contribute to the project, the hard part is 'just navigating the content, knowing where to start'. As a result, Henton is now considering offering the Teacher Leaders smaller, more discrete tasks to accomplish.

Third, the project leaders feel that in their recruitment efforts they may have targeted teachers at the wrong career stage. Lightle and Henton initially focused their recruitment on teachers who have had five to ten years of teaching experience. They have found this not to be as ready an audience, however, as they had hoped, perhaps in part, they now realise, because teachers at this career stage are more likely to leave the classroom altogether, either by going into administration or moving out of education

<sup>7</sup> An abstract of the NSF proposal is available here: [www.nsf.gov/awardsearch/showAward.do?AwardNumber=0840824](http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=0840824)

<sup>8</sup> As of late June 2009, Lightle reports that with the school year at an end, the Teacher Leaders have become much more active.

entirely, than are teachers at earlier stages of their careers. Lightle and Henton have been rethinking that recruitment strategy and plan to recruit more actively among both novice and more experienced teachers.

Given how difficult it has proven to recruit Teacher Leaders, even with the incentive of a stipend provided by the NSDL Pathways grant, what steps will be needed to get rank-and-file teachers to actively participate in the social network? When asked what incentives might entice teachers to contribute content, Lightle said that increasingly, teachers are requesting a letter from the project leaders acknowledging contributions to MSP2 as a professional development activity. If their MSP2 work comes to be considered professional development, she believes that teachers will be much more willing to serve as active contributors.

In addition to recruiting Teacher Leaders, whose work at this time has been focused on encouraging interaction among those already visiting the site, the National Middle School Association conducts several ongoing activities that it can leverage to draw traffic to the MSP2 site. The Association promotes MSP2 to its core audience of middle school educators through its annual meetings, online conferences, membership newsletters, and other means. A network of 58 affiliate organisations in the United States, Canada, Europe, and Australia enables NMSA to reach a total of over 200,000 middle school principals and teachers, professors, college students, parents, community leaders, and policymakers at the local, regional, and national levels. It is worth noting that middle school educators specialising in math and/or science – the primary target audiences for MSP2 – are a subset of this larger NMSA audience.

Supplementing the efforts of the project staff of MSP2 is the NSDL Resource Center, which provides outreach and support for all NSDL-related projects; the Center has assisted MSP2, for example, by running a web seminar series for middle school teachers to introduce them to material on the MSP2 site. Susan Van Gundy, the Center's Deputy Director and head of Strategic Partnerships, and Robert Payo, Outreach and Professional Development Manager, understand their strategy as leveraging their own relationships with NSDL partners to assist MSP2. For example, the Resource Center has a relationship with the Southern Regional Education Board (SREB), an organisation with a particular interest in improving middle school education. Van Gundy and Payo believe that by brokering an arrangement between MSP2 and a group similar to SREB they may be able to find an organisation that would support the activities of the MSP2 project as a service to its membership.

### Identifying online resources and creating content: The Ohio State University team

The MSP2 team at Ohio State, led by Lightle, is responsible for creating the MSP2 content and taking advantage of the technical infrastructure of NSDL and free Web 2.0 tools. They identify subject priorities to cover, search out relevant web-based resources (whether from NSDL-funded projects or from other sources), and catalogue the resources using the NSDL cataloguing interface. The staff also create original content via the NSDL wiki (this is how the Explore in Depth publications are created) and NSDL's Expert Voices blog. Once the OSU team introduces new content to the MSP2 site, it can be developed further by the other project partners and the community of users through the addition of comments on the blogs and links to related resources. At the same time, MSP2 and the other Pathways gain value by bringing content and tools from other

NSDL partners into their resources, and thus they rely on the larger Library to provide background citations, tools, and a rich collection of content as they shape material aimed at their own communities of users.

In addition to leading the content-creation elements of the Pathway, OSU provides overall leadership for the project and is the liaison with the other two partner organisations; with the NSDL Resource Center and Technical Network Services; and with the evaluation group. In addition, OSU represents the MSP2 project at NSDL annual meetings and at NSF briefings on NSDL.

Lightle is also responsible for initiating and managing contact with the project's advisory board. This board, which is made up of twenty middle school teachers, middle school administrators, and education professors, met for the first time in February 2009. So far, Lightle feels that the board has been a great resource for dissemination and outreach. The board also recently encouraged the project leaders to develop a plan for approaching a senior administrator at Ohio State to talk about how the institution might be able to help sustain the project.

### Developing content for middle school students: The Education Development Center team

The Education Development Center (EDC) is a non-profit organisation that designs, delivers, and evaluates programmes to address challenges in education. EDC is involved with several NSDL-funded projects, including the Gender and Science Digital Library, the Effective Access research project, and Fun Works, a resource that uses children's current interests, such as music and sports, to help them explore science and math careers through interactive tools. The MSP2 team at the Education Development Center is headed by co-PI Sarita Pillai, who is funded to work on the project for 30% of her time, and includes three other staff members who devote portions of their time to the project.

While the team at Ohio State focuses mainly on developing tools and content for teachers, the team at the Education Development Center is developing materials that will be part of the MSP2 site, and which will help introduce MSP2 to a student audience in after-school programmes, museums, and in other informal educational settings such as community centres. A series of youth-based Virtual Learning Experiences are to be developed in collaboration with design teams of students, and are meant to adopt the same inquiry-based learning and collaborative site-design techniques used in the development of the Fun Works project.

### Other partnerships for sustainability

In the first nine months of the current grant, very little has been done concerning revenue-generating strategies. MSP2 leadership has not yet determined what it would cost to run a pared-down version of the project in the post-grant period and has not developed revenue models that would support such a pared-down version, focusing instead on the start-up phase of site and content development. 'This year has been about migrating static content into a wiki space, building the social network, figuring out what digital tools will have the most impact on users, and having conversations and establishing relationships with other organisations who can help us with sustainability,' according to Henton.

The project leaders have, however, started actively considering scenarios involving partners who might eventually take responsibility for care and feeding of the MSP2 content and

user community. One possible partner is Curriki, a site for collaboration among educators around freely-available curriculum resources. MSP2 leadership is exploring how bridges could be built to connect content coming in through Curriki to MSP2 and vice versa.

Another possible partner identified by the project leaders is Elluminate, a platform for online videoconferencing for educators.<sup>9</sup> MSP2 leadership is looking at this service because it has capacity to host events and training, but also because it has launched a beta prototype of a social network meant to cater to the whole K-12 field. MSP2 is considering moving from the Ning-based social networking platform it currently uses over to Elluminate's new network, called 'Learn Central', as a way to 'open up other sustainability possibilities' and gain access to the broader audience of educators they feel Learn Central will reach.<sup>10</sup>

Lightle also hopes the project's partner organisations will build on current revenue-generating products and services to provide ongoing support for MSP2. She notes that Ohio State, for example, is able to work with other institutions and organisations to offer course credit for workshops or online classes, and that the National Middle School Association has existing capacity to market and conduct fee-based workshops, seminars, and webinars. At this point, however, project partners have no formal obligations to provide support for MSP2 beyond the initial term of the grant, and this year, the NMSA itself has been buffeted by budget cuts and layoffs that have already had an adverse effect on the MSP2 project staff. Furthermore, the project partners have not yet outlined a clear plan for revenue-generating activities, so relying on this strategy as a sustainability plan is risky.

## Understanding users

While the NSDL Middle School Portal site (the predecessor to MSP2) continues to be updated and draws high traffic – from 1 September 2008 through 31 May 2009, the MSP site had 315,687 sessions with almost a million page views<sup>11</sup> – the social networking site of MSP2 is also starting to show progress. It launched on 1 February 2009; at the end of April 2009 there were 517 visits with 2,299 page views, and at the end of May 2009 there were 873 visits and 3,501 page views.

MSP2's leaders lament the difficulty in obtaining clear web statistics on traffic<sup>12</sup>, and they realise that middle school science and math teachers are not the site's only visitors. 'Just because we are developing resources for middle school teachers, it has no impact on who actually is visiting our site,' according to Lightle. In addition, for the first several months after its launch, signing up on the social networking site required provision of very little personal data, making it difficult for the project to learn much about even those users signing up for personal pages. Since late April 2009, the sign-up function has requested (but still does not require) additional information including teachers' subject area, grade level taught, number of years in the classroom, and how the user found out about MSP2. Already, Lightle has noticed some important trends, in particular that the teachers signing up on the site are more experienced than she would have imagined.

<sup>9</sup> [www.illuminate.com](http://www.illuminate.com)

<sup>10</sup> [www.learncentral.org](http://www.learncentral.org)

<sup>11</sup> In addition, the two project blogs had 66,590 sessions and 142,767 page views.

<sup>12</sup> The difficulty stems from several factors: content is coming from multiple tools and servers, different metrics packages are in use, and data is spread across several different blogs.

## MSP2 as part of NSDL

NSDL as a whole has undergone a significant change since late 2008. In October 2008 the NSDL transitioned to a new phase of development and organisation, with the granting of awards for the NSDL Resource Center and Technical Network Services (TNS). TNS, based in the Computer Science Department at Cornell University, provides operational support, tools, and technical development for the NSDL Pathways, and is partially supported by contributions from the Pathways grantees. The NSDL Resource Center, located at the University Corporation for Atmospheric Research in Boulder, Colorado, provides community outreach, data gathering, and services and support for teacher training for all of the Pathways projects.

Starting in 2008, all new Pathways, as part of their funding arrangement with NSF, have been required to allocate 15% of their grant funds to TNS; they are not required to allocate funds to support the services of the Resource Center. Lightle has taken steps to ensure that MSP2 is making use of the tools and services available through the NSDL technical platform, and the project is already integrated with and to some extent dependent on the larger NSDL organisation. 'I have taken advantage of every tool that they have,' says Lightle, 'even when their tools are not as easy to use as other free Web 2.0 tools.' MSP2 uses the NSDL central data repository to generate and hold its resource metadata. This strategy is important for MSP2: it thoroughly integrates MSP2's collection into NSDL, ensuring that all MSP2 materials are discoverable, at an item level, within the larger Library, as well as through the MSP2 site.<sup>13</sup> The project is also using the NSDL-designed Expert Voices blogging technology for community blogging.

But there have been cases where MSP2's desire for certain functionality and the technical requirements of the project have led its leaders to look beyond TNS, making use of tools and applications freely available elsewhere. In developing MSP2, project staff have used Ning for building the social network, Twitter for microblogging, and Diigo for sharing site bookmarks. In some cases, they have found that the tools available to them via TNS would require significant tweaking to serve MSP2's needs. By Lightle's estimate, the OnRamp content management system offered by TNS would have cost more to reconfigure for use in creating the Education Development Center's MSP2 Virtual Learning Experiences than the equivalent of 15% of the MSP2 grant. This consideration led the Education Development Center to use instead the open source content management system Moodle. Using non-TNS tools and software makes MSP2 less dependent on the central NSDL infrastructure, but also more vulnerable in terms of needing technical staff and expertise to support these tools.

## Benefits and challenges

Since MSP2 is in its grant phase and a sustainability model is still being formulated, it is premature to assess the success of the model. It is not too early, however, to consider the potential benefits of the model being considered, as well as the challenges MSP2 is likely to face in establishing long-term sustainability. The project is in the fortunate position of still having two more years in which to thoroughly explore and evaluate its options before the grant period ends in 2011.

<sup>13</sup> Not all of the Pathways employ this strategy. Some of them have decided not to expose item-level metadata in the NSDL repository. This decision is significant, because if a Pathway does not provide NSDL with item-level metadata, its content will not appear in a search conducted through NSDL unless a user employs as a search term the official title of the Pathway collection.

By establishing a partnership with the National Middle School Association, the project has laid the foundation for developing a potentially large and committed user base. The project leaders have also understood the importance of proactively building user communities by establishing the Teacher Leaders programme, recognising that communities will not emerge automatically just because a resource has been created.

In addition to the core audience of those who visit and use MSP2, the Teacher Leaders, who contribute content and facilitate interactions on the site, constitute another MSP2 user group. The project leaders have recognised the importance of setting clear expectations and creating incentives for Teacher Leaders, and they are already gaining valuable feedback about the effectiveness of those incentives. More must be understood, however, about what motivates (or could motivate) this group to participate, to further invigorate the Teacher Leaders to develop content and to draw more people to the site. By establishing some measurable targets for the number of users and contributors the project leaders expect and suggesting tactics the Teacher Leaders might use to attain these targets, project leaders will find it easier to establish clear strategies and goals to be reached in specified time frames.

If developing the user community is a key factor in the sustainability plan for the resource, nothing is more important than developing a very clear understanding of the target users of the MSP2, and determining why and how they would want or need to use the site. A critically important challenge in the next

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two years will be to assess the true size of the potential market for MSP2 and the different segments that comprise its audience. By requesting information from users when they register on the site, as the project is now doing, the project leaders can gain valuable insight about users' backgrounds, experience, and interests. Project leaders may be able to learn much from early adopters who supply contact information; a pool of such users can be drawn on for focus groups, for example. The information users provide can also be employed to create connections among people with similar interests. Once the potential core users and secondary users of the site have been identified and their needs have been understood, the project leaders can introduce incentives, such as professional credentials or continuing education credits, which could encourage greater participation. As part of this stage, researching the 'competition' for teachers'

attention in this space will be very important in understanding how to best position the resource for its audience of teachers.

First, the project needs to assess the costs of ongoing development. This might involve seeking further in-kind contributions from one of the partner institutions. It is certainly possible that the project could be sustained at well below the annual budgets allotted in the grant period (Year 1: \$991,765; Year 2: \$833,743; Year 3: \$544,191).<sup>14</sup> At the same time, paring the staff to such a low level that the resource cannot be regularly updated will rob the project of potential future revenue for reinvestment, as it would be difficult to sell yearly subscriptions to a relatively static project. As part of their sustainability planning, the project leaders and advisory board will need to evaluate the ongoing costs associated with sustaining the project at an operational rather than a development level, and identify the job functions that will be required for continued development of the project.

Second, the project leaders should assess potential sources of earned revenue. The project currently has the benefit of substantial start-up funding to help build the resource and establish a strong user base. But that grant funding comes with a clear end date, so the project leaders need to think immediately about realistic possible sources for revenue and in-kind contributions. Potential revenue streams should be modeled to show the revenue attainable in various scenarios, such as offering fee-based educational programs or charging for access to designated sections via institutional subscriptions. (The information to be gathered about audience and market segments, as described above, would be invaluable in the planning process, and could be used to estimate revenue streams for each model under consideration.) By identifying possible sources of revenue and eventually reinvesting income in MSP2, the project leaders could continue to enhance its value to users.

The MSP2 has an advantage over many start-up projects in that it is closely affiliated with well-established institutions that have compatible missions and that are interested in the success of the project. The Ohio State University serves as the lead institution, with the National Middle School Association and the Education Development Center serving as partner institutions, the Ohio Evaluation and Assessment Center serving as an external evaluation partner, and the NSDL Technical Network Services and Resource Center providing central infrastructure and outreach services.

The multi-institutional nature of the project, however, also creates clear challenges for management and coordination. One such challenge is the fact that MSP2's leaders are each assigned to the project for only 25-50% of their time; it seems likely that the leaders could exert greater impact if at least one of them were devoted to the project at a larger percentage of time. Turmoil at one of the partner institutions has complicated matters further, as some people originally assigned to the project have left or been laid off when departments were downsized. In a complex case like this, it may be worth exploring whether the operational phase of the resource should involve a more

<sup>14</sup> Assuming that the community takes on responsibility for a significant amount of content contribution, one possible scenario would be to maintain the site with a much smaller staff than it currently employs – perhaps with just one project editor and a part-time web developer. The costs for technology staff associated with tool building could potentially be transferred to the NSDL Technical Network Services group, further decreasing MSP2's budgeted costs involved in ongoing maintenance of the site.

centralised organisational structure than has existed during the development and launch phase.<sup>15</sup>

Coordination among multiple organisations is a complicated task in the best circumstances. While there is obvious value in collaboration, the scattering of employees and responsibilities among five separate institutions will make it even more important for MSP2 leaders to continue to establish clear deliverables for each partner institution. Furthermore, it is important to ensure that organisational commitments and priorities are maintained, even if the individuals originally responsible for particular tasks move on.

Perhaps the most significant governance challenge for a project like MSP2 is the continued need for advisors with experience in sustainability and business planning. Of the 10 FTE employees and 20 advisory board members, most come from an academic background, which is suitable for working on an educational project. For projects like MSP2, however, there should be room on an advisory board for some members with extensive business experience who can help make the tough decisions around building a sustainability plan. The kind of business planning and revenue modelling described above may require staff abilities that have not been adequately built into the design of the project.

## Broader implications for other projects

*Sustainability planning must start in earnest at the very beginning of the project in order to allow the time needed to fully explore and test the available options, well before the grant period ends.* While most grant-funded projects include funding for staff involved in the project's development, they often do not have capacity for sustainability planning. This raises two questions: who will have the time, experience and resources available for the research and analysis necessary to plan for sustainability, and at what point in the project should its leaders begin exploring ongoing operating costs and revenue?

The risks of not addressing these questions are significant – in this case, not just for MSP2, but for NSDL as a whole. NSDL is a large organisation whose value is intended to derive from the aggregated content, tools, and community developed by the Pathways; thus, letting parts of the organisation falter puts the whole enterprise at risk. Yet currently, there are no mechanisms built into the NSDL central organisation for assisting the Pathways with post-grant business planning. Project leaders, then, should ask themselves as they draft a grant proposal whether the grant would allow them access to the expertise needed to help plan for the long-term sustainability of the resource.

*There can be multiple sources of value in a single resource, and project leaders must identify which most need sustaining.* There are three elements to the MSP2 project that might be sustained: the content and metadata created for middle school science and math teachers; the centralised NSDL technical infrastructure that supports the project; and the project's user community of teachers. As the project develops, its leaders will need to ask themselves what priority should be assigned to each of these three categories as they think about allocating resources for continued sustainability.

<sup>15</sup> There is an active debate in the not-for-profit funding community over the wisdom of encouraging collaboration between organisations on grant applications, and whether these relationships hamper grantors from seeing optimal results. For more on this, see Francie Ostrower, 'The Reality Underneath the Buzz of Partnerships: The Potentials and Pitfalls of Partnering', *Stanford Social Innovation Review* (Spring 2005), pp. 34–41.

In the example of MSP2, this is an interesting question: to what extent does the value of a project like MSP2 lie in the content on the site? In many cases, the content existed in the larger National

“NSDL is a large organization whose value is intended to derive from the aggregated content, tools, and community developed by the Pathways; thus, letting parts of the organization falter puts the whole enterprise at risk.”

Science Digital Library before the original MSP was developed; this Pathway project was intended partly to help expose the content, but the content itself would not necessarily disappear if MSP2 were no longer functioning.

Likewise, a project's central infrastructure should offer benefits in terms of cutting costs and providing services and a stable platform for individual collections. In this case, the NSDL central infrastructure has created challenges (including mandatory overhead costs), but it also offers potential benefits (the possibility of long-term access to the pre-existing structure, even in the event that MSP2's sustainability plans do not come to fruition). This question of central infrastructure versus distributed infrastructure is one that many funding agencies, universities, libraries, and individual digital projects are grappling with right now, and it has implications for technology, costs, organisational models, staffing, and sustainability.<sup>16</sup>

In addition to content and infrastructure, project leaders must cultivate users. In the case of MSP2, maintaining an active and loyal community of users is the very basis of the project's value proposition. The MSP2 project leadership team clearly values the community of teachers who contribute to and utilise the site's features; this community adds value to the MSP2 site by collaborating around existing content, creating new content, drawing new users to the site (through the work of the Teacher Leaders), and building relationships with other users to address common teaching challenges. In the time remaining on the grant,

<sup>16</sup> The NSDL project as a whole is an example of a digital resource that is experimenting with the model of a centrally funded and managed infrastructure to support, in various ways, a group of smaller independently funded and managed digital resources. In 2003 the NSF created a blue ribbon committee to write a report on the emerging needs of the nation for a technical infrastructure for science, math, technology, and education. The report, available at [www.nsf.gov/od/oci/cj\\_v5.pdf](http://www.nsf.gov/od/oci/cj_v5.pdf), underlined the need to 'define and build cyberinfrastructure that facilitates the development of new applications, allows applications to interoperate across institutions and disciplines, ensures that data and software acquired at great expense are preserved and easily available, and empowers enhanced collaboration over distance, time, and disciplines'. If the NSDL Technical Network Services and Resource Center can be considered an example of the logic of a common cyberinfrastructure in action, observing the Pathways' efforts towards sustainability will provide a valuable example of how this model might work.

the project leaders will need to find ways to learn as much as possible about these users so that they can build a resource that is highly valued by the community that will need to play a major role in sustaining it for the future.

## Appendix A: Interviewees

**Mary Henton**, Co-Principal Investigator and Manager, MSP2 Grant, National Middle School Association, 1 May 2009, 28 May 2009

**Kaye Howe**, Principal Investigator and Director, National Science Digital Library Resource Center, 12 December 2008

**Kimberly Lightle**, Principal Investigator and Director, MSP2, and Digital Library Director, The Ohio State University, 16 March 2009, 5 May 2009, 22 June 2009

**Robert Payo**, Outreach and Professional Development Manager, National Science Digital Library Resource Center, 29 May 2009

**Sarita Pillai**, Co-Principal Investigator, MSP2 Grant, and Senior Project Director, Education Development Center, 16 April 2009

**Susan Van Gundy**, Co-Principal Investigator and Deputy Director and Strategic Partnerships, National Science Digital Library Resource Center, 29 May 2009

## Appendix B: Summary of revenues and costs

Because this case study examines MSP2 at a point when it does not have any revenue stream other than its original NSDL grant, no summary of revenue and costs is included here. The case study contains sections on project costs and potential revenue models.

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