Challenge Based Learning

A Classroom Guide

Contents

Introduction to Challenge Based Learning

Challenge Based Learning is a collaborative learning experience in which teachers and students work together to learn about compelling issues, propose solutions to real problems, and take action. The approach asks students to reflect on their learning and the impact of their actions and publish their solutions to a worldwide audience.

Students today have instant access to information through technology and the web, manage their own acquisition of knowledge through informal learning, and have progressed beyond consumers of content to become producers and publishers. As a result, traditional teaching and learning methods are becoming less effective at engaging students and motivating them to achieve.

Today's students are presented with content-centric assignments that meet standards but lack a real-world context and opportunities for active participation. Because these assignments often fail to engage students, they can lead to uninspired work and a gradual process of disengagement. Studies from the National Center for Education Statistics show that more than 30% of students drop out before the end of their first year of high school. Fortunately, the disengagement process can be reversed, and one of the most effective strategies for doing so—as reported by students themselves—is more relevant, challenging coursework (John M. Bridgeland, John J. Dilulio, Jr., Karen Burke Morison, "The Silent Epidemic: Perspectives of High School Dropouts," Civic Enterprises in association with Peter D. Hart Research Associates for the Bill & Melinda Gates Foundation, March 2006).

To address this need, Apple Inc. worked with teachers and leaders in the education community to develop a new approach to teaching and learning called Challenge Based Learning, an engaging, multidisciplinary approach that starts with standards-based content and lets students leverage the technology they use in their daily lives to solve complex, real-world problems. Challenge Based Learning is collaborative and hands on, asking students to work with other students, their teachers, and experts in their communities and around the world to develop deeper knowledge of the subjects they are studying, identify and solve challenges, make a difference in their community, and share their results with the world.

The interdisciplinary, cooperative, and applied nature of Challenge Based Learning makes it perfect for students of all ages. This guide is for educators from elementary grades to higher education who want to implement Challenge Based Learning in their learning environment. The guide includes specific recommendations for planning and implementing Challenge Based Learning and includes best practices, practical tips, frequently asked questions, and ways to adapt the approach for younger students. The Appendix contains a collection of resources designed to facilitate the Challenge Based Learning process.

Teacher Planning and Preparation

Best Practices

Challenge Based Learning mirrors the 21st century workplace. To stay true to its intent, make sure participants:

- Work in collaborative groups
- Use technology commonly used in daily life
- Tackle real-world problems using a multidisciplinary approach
- Share the results with the world

Challenge Based Learning mirrors the 21st century workplace. Students work in collaborative groups and use technology to tackle real-world issues in the context of their school, family, or local community. For teachers, the task is to work with students to take multidisciplinary standards-based content, connect it to what is happening in the world today, and translate it into an experience in which students make a difference in their community. Accomplishing this goal necessitates giving students structure, support, checkpoints, and the right tools to get their work done successfully, while allowing them enough freedom to be self-directed, creative, and inspired.

Understanding the Process

Challenge Based Learning begins with a big idea and cascades to the following: the essential question; the challenge; guiding questions, activities, and resources; determining and articulating the solution; taking action by implementing the solution; assessment; and publishing the solution and sharing it with the world. Reflection and informative assessment are an important part of the process at every stage as they reinforce learning and prepare students for what is coming next.

The Framework

Big Idea

Essential Question

The Challenge

Guiding Questions	Guiding Activities	Guiding Resources: Web and iTunes U

Solution: Implementation

Evaluation/Assessment

Publishing: Student Solutions	Publishing: Student Reflections

Although teacher involvement throughout the Challenge Based Learning process is crucial, its nature changes as students progress through its stages. Early on—when you introduce Challenge Based Learning to your students and set up the challenge—you are making decisions, communicating information, teaching skills, and answering questions about how the process works and what is expected of your students. In the middle stages, students take charge of planning and researching their own work and you serve primarily as a project manager and mentor working alongside the students, helping them through the rough spots and keeping them on track. In the later stages, students are deeply engaged in their own work while you ensure that they have mastered the required knowledge and skills through appropriate assessments. Finally, you will transition into the role of product manager supporting the students as they implement, evaluate, and publish their solutions and results.

Challenge Based Learning emphasizes exploring topics from many angles and through the lens of multiple disciplines, which allows students to appreciate the natural connections between subject areas that might not always be evident. As a result, it works especially well when teachers from different disciplines work together. Just as working in collaborative groups teaches students important life skills, teachers who have implemented Challenge Based Learning in teams report that collaboration with other teachers is one of the most beneficial and enjoyable aspects of the approach for their own professional growth and development.

Access to Technology and a Collaborative Workspace

Challenge Based Learning requires real-world tools, so you and your students will need ubiquitous access to technology that is commonly used in 21st century life and work. This ideally includes computers, rich media creation tools, the Internet, and mobile devices for anytime, anywhere access to information, content, and communication. In addition, because you and your students will work in teams and not all of the work will take place during class, you will need a collaborative workspace that is available to everyone 24/7.

At a minimum, the workspace will include a calendar, a place to store notes, documents, and other digital assets such as PDFs, video clips, and audio and video podcasts. A variety of resources are available to create collaborative workspaces. Examples are:

- Apple tools: iWeb, iWork.com, MobileMe, and the resources included with Mac OS X Server Snow Leopard provide a set of tools for building a collaborative environment to support challenges.
- Wikis and other free web-based tools can be configured to work with classrooms and community groups.

Defining the Student Products

Throughout the challenge the students, both in teams and as individuals, have the opportunity to create a variety of products, including: a challenge proposal video, a set of guiding questions, research plans and results, solutions with beta testing plans and evaluation parameters, a solution video, student journals, and individual reflection videos. The quantity and depth of products will depend on where the students enter the process, their grade levels, and the length of the challenge. At the beginning of the challenge, teachers and students should work together to define the products and determine how they will be assessed. Examples of potential student products include:

The challenge proposal. Student teams produce a short (one-to-two minute) video that states the big idea, the essential question, and the challenge, including why the

Best Practices

- Connect standards-based subject matter to 21st century content and skills.
- The teacher's role is that of project manager or mentor.
- Let students determine the direction of their research and solution.
- Students have the opportunity to act on their solutions.

For Younger Students

Due to age restrictions and the complexity of some online tools, you may need to enlist the assistance of parents or restrict the use of these tools to the school day.

challenge is important. The proposal should be presented in a compelling manner that will act as an invitation to others to join them in finding solutions.

Guiding questions. Once the challenge has been determined, students generate sets of questions that will guide their search for a solution. The question sets should be extensive and represent the needs of each group member.

Research plan and timeline. This product is created by the students to organize and document their efforts to research and answer the guiding questions. A well-prepared plan will ensure a thorough and organized learning experience as students search for a solution. The plan also provides a way to manage the learning experience. The teacher serves as a guide or mentor to insure the timeline and milestones are appropriate for the time allotted for the challenge.

Implementation and evaluation plans. Once a solution is developed, students will create an implementation and evaluation plan. The plan should include an in-depth description of the solution, how it was determined, where it will be implemented, the participants, and how success will be measured. If time is available, the plan can include a beta testing process with multiple cycles of evaluation.

Solution video. After the solution has been implemented and evaluated, each team creates a video presenting the solution to the world. This video includes information about the group, a statement of the challenge, why this challenge is important in their specific context, how it was implemented, how it was measured, and whether it was a success. Students should be collecting video, audio, and images throughout the experience to be used in the solution video.

Student journals, written or video. Provide students with the opportunity to document their personal and group experience through written journals (blogs, wikis, social networking communities) or video journals. You will want to make sure that you can access the journals to track progress and include them as part of the evaluation process.

Final reflection videos. At the conclusion of the experience, the students reflect on what they learned about the content, process, and overall experience. Providing a series of prompts will allow the students to organize and present their ideas in a concise manner.

Best Practice

Clearly define the products the students will create during the challenge and how they will be evaluated.

Determining Assessment Strategies

In deciding how to assess your students' learning and their final products, place appropriate emphasis on three areas: content knowledge and understanding, mastery of real-world skills, and the process of Challenge Based Learning.

Challenge Based Learning helps students develop deeper knowledge and understanding in core subject areas as well as 21st Century Content, Learning and Innovation Skills, and Life and Career Skills.

To prepare yourself and your students for evaluating their work, you will want to think through two kinds of assessment strategies: informative and summative. Informative assessment occurs continuously throughout the process, guiding and facilitating learning, while summative assessment evaluates progress at checkpoints or at the conclusion.

Keep in mind that because Challenge Based Learning is collaborative and uses technology, students often work in informal team settings or online and therefore are routinely exposed to a variety of continuous feedback that can either deepen learning or cause confusion, depending on how they use it. For example, in addition to teacher feedback, students will receive feedback from other students who are working in the same physical and virtual workspaces and through joint development of wikis, blog responses, text messaging, verbal interactions, or video/audio responses. This is also the case when students produce their solutions and publish to the web: peers, parents and family, experts, and others will provide feedback.

More formal sources of informative assessment also vary considerably and might include student journals, peer reviews, teacher observations, student-teacher conferences, interim work reviews (based on rubrics), and others.

To prepare your students for interpreting and using all feedback beneficially, schedule regular checkpoints with them in teams and individually during which you can help them clarify goals, process steps and timelines, and encourage reflection. While Challenge Based Learning puts much of the responsibility in the hands of students, this is one area where your role as teacher is vital. The more you know about each group's progress and the feedback they are getting from all sources, the better you can offer a guiding hand when needed. Examples of some prompts you can use during these checkpoints are:

- What part of the process are you working on this week?
- What new knowledge or skills have you acquired this week?
- What has been your biggest success this week?
- What has been your biggest challenge this week?
- How is your group doing as a team?
- What are your top priorities for next week?

Summative assessment can take a variety of forms to meet the needs of your particular situation. With Challenge Based Learning a summative event is built in with the completion and implementation of the solution. The solution will be tested in the real world and students will receive immediate and direct feedback.

Consideration needs to be given on how to evaluate students at both the group and individual level. Students can be evaluated using traditional school and district assessments to determine subject and content knowledge. Other ideas include oral defenses, conference presentations, and job evaluations for the specific role they served on their team. It is important to determine the summative evaluations during the planning process and provide the students with specific expectations and rubrics.

Best Practice

Evaluate school and district standards and assessments when determining your Challenge Based Learning plan.

Good Idea

Include student input when determining assessment strategies.

Including real-world summative assessments such as job evaluations and conference presentations provides students with skills that will serve them well in the workforce.

School and Community Partnerships

Best Practice

Look for government, business, community, or university partners to help identify relevant big ideas. These organizations also can be an excellent resource during the guiding activities phase.

Challenge Based Learning asks your students to take action on their solutions at home, at school, or in the larger community. You can pave the way for them by helping them find community partners and spreading the word. As you plan the challenge, build in time to identify possible community partners, set up meetings with stakeholders, and send news releases to those who might be involved. If students will attempt to change the way the school uses paper, for example, make sure to inform other teachers and administrators so that the students' campaign for change does not come as a surprise. If the solution is a long one, keep the community interested with short updates and meetings. Students can work on this too; assign each group to write a weekly "news flash" about what they have discovered and what they are planning, then compile and distribute them via local newspapers, blogs, and community forums.

Knowing Your Evolving Role

Best Practice

Resist the temptation to jump in and find the solutions for your students.

One of the biggest differences between Challenge Based Learning and more traditional approaches to teaching and learning is what it asks of schools and teachers. With Challenge Based Learning, schools evolve from being information repositories to places where students can acquire real-world knowledge, solve authentic real-world challenges, and develop skills they can use to solve complex problems for the rest of their lives. Similarly, teachers become more than information experts; they become collaborators in learning—leveraging the power of students, seeking new knowledge alongside students, and modeling positive habits of mind and new ways of thinking and learning.

The role of collaborator can be a difficult one for teachers who are unaccustomed to it. You may be tempted to rush the process, over-engineer the activities, and point out solutions to students. However, it is vital to give students space and time to make mistakes, follow false paths, and correct their own course. You do not need to personally know the solutions to the challenge. In fact, if you are doing it right, you won't know them beforehand. The problems are big as well as real and the challenges will not be simple to solve. Many "right" answers will exist, and the role of the teacher in Challenge Based Learning is to find the solutions with the students, not for them. Trust that this will happen, and resist the temptation to do it for them.

Good Idea

Create a wiki or collaborative space with general tips, resources, and self-guided technical help tools to support your students throughout the process.

Having said that, keep in mind that while students focus on each discrete part of the Challenge Based Learning process, they may find it very difficult to keep the larger picture in mind, especially at first. As the project manager, you can help them understand when it is time to finish up one stage in the process and move on to another. Remind them to keep their calendars and work plans current and handy. Help them learn to manage their time.

Challenge Based Learning in the Classroom

The Challenge Based Experience can be grouped into five interrelated stages. This section reviews the elements of each stage and provides practical tips and resources for implementation.

The "Resources" section at the end of the document contains a variety of teacher-created materials to support the entire process.

Stage 1: From Big Idea to the Challenge

Good Idea

Use technology (iTunes U, FaceTime, iChat) to expose your students to a wide variety of global and local experts and issues.

Start by working with students to identify the big idea. A big idea is one that is important on a global scale and that students can work with to gain the deep multidisciplinary content knowledge and understanding that is required by the standards for their grade level. A good place to look for big ideas is in the major news stories of the day.

Examples are:

- **Sustainability** of natural resources such as water, food, energy, and air
- **Climate change** and its effect on the planet
- **Public health** threats such as pandemics
- **Economy** downturns, recovery, and growth
- **Conflict** and human nature
- Personal, group, or cultural **identity**
- **Health and wellness**

Next, work together to formulate the essential question, which serves as the link between your lives and the big idea. The question should be answerable through research, help focus students' efforts, and provide a framework for the challenge.

Examples of essential questions connected to big ideas are:

For Younger Students

The big ideas, essential questions, and challenges will vary depending on the grade level of the students. For example, an essential question related to conflict and human nature for younger students might be "How can people who think, look, or act differently get along?" The challenge might be "Improve relationships at your school."

- **Sustainability**: What is the impact of my water consumption on my community?
- **Climate change**: What is the impact of my use of fossil fuels on my planet?
- **Public health**: How does my personal access to healthcare affect global disease pandemics?
- **Economy**: How does graduating from high school or college affect the economy?
- **Conflict**: How do views on race, ethnicity, and nationality contribute to conflicts?
- **Identity**: What groups do I belong to and what roles do I play?
- **Health and wellness**: How do my personal food choices affect the health and wellness of my community?

Best Practice

Select the challenge carefully and make it real and meaningful.

The challenge turns the essential question into a *call to action* by charging participants with developing a local solution to a global problem. A challenge is immediate and actionable. Choosing and setting up the challenge is crucial. If it is interesting and sufficiently close to home, students will derive personal meaning and feel a sense of accomplishment upon proposing and implementing a solution. If the challenge also has greater global significance, students will gain confidence and self-esteem as they engage with issues they know to be truly important.

If the challenge is too broad or vague, students will flounder. If it is too narrow, they will not be able to fully experience the self-direction that is required to develop the skills that Challenge Based Learning cultivates. Challenges should be difficult and have multiple possibilities for solutions.

The amount of time your students have to work on the challenge is also important. Some challenges can be addressed in a day or a week while others need a semester or even an entire school year. If the challenge is too big for the allotted time, students will feel pressured or frustrated. If it is too small, they will quickly lose interest.

Finally, it is important for the challenge to be real and meaningful to the students. If a challenge is contrived or something that the students cannot personally connect with, they will not be fully engaged in the process.

Examples of challenges drawn from the big ideas and essential questions above are:

- **Sustainability**: Reduce your family's (or your school's) water consumption.
- **Climate change**: Reduce your family's (or your school's) use of fossil fuels.
- **Public health**: Increase the availability of flu vaccines to children in your community.
- **Economy**: Increase the percentage of students in your class who stay in school for one more year.
- **Conflict**: Improve tolerance at your school.
- **Identity**: Create opportunities for group dialogues at your school.
- **Health and wellness**: Increase the number of healthy food choices served at school (or at home).

Best Practice

Reinforce that the challenge presents students with a chance to take action on a global problem locally and make a positive difference in their school, family, or community.

Once the students understand the challenge, organize them into teams so they can begin the search for a solution. Demonstrate the collaborative workspace you have set up and reinforce that you expect them to use it to store and share notes, documents, and other digital assets, and to collaborate and communicate throughout the process. Introduce them to any other technology that they will use during the process, including cameras and applicable software.

Tips for Stage 1

Best Practice

Schedule regular checkpoints with your students to ensure that they are on track and using feedback to improve their work.

Brainstorming. If your students are not familiar with brainstorming, hold a short session on how to do this. Make sure they understand that all ideas are welcome and every contribution gets recorded. Value judgments are not permitted, whether good ("great idea!") or bad ("that would never work!"), and everyone's voice gets to be heard. Make sure students have an easy way to record ideas rapidly.

Time management. Because Challenge Based Learning usually unfolds over an extended period of time, students might need help managing their time in each stage. Work with them to set realistic goals and expectations. If students spend too much time on one stage, they will not have enough time for subsequent stages, and they may feel frustrated and bogged down. You can help by providing them with scheduling tools and suggestions for how much time is appropriate to spend on each stage.

Sources of Research

- iTunes U, the largest repository of free vetted education content
- Scientific or government websites
- Online journals and periodicals
- Online special interest communities
- School or public library
- Local, state, and federal government officials
- Faculty at local colleges and universities
- Staff at museums, historical sites, and science centers
- Local experts, senior citizens, and hobbyists

Technology. If the technology being used is new to the students, set aside time for learning how to use it. Also plan for troubleshooting and dealing with unexpected setbacks. Provide very clear guidelines about technical specifications for videos, web material, or other formats.

Research skills. To prepare for the challenge, you may need to include a review of Internet research skills, including identifying keywords to use in their search for information and recognizing the many different types of available resources. Provide guidance and resources to help students assess the validity of resources.

Form working groups. Students should consider working in groups of four or five. Reinforce that each group is responsible for its own research, solution, implementation, analysis, and final product. This gives the students an opportunity to work collaboratively while also leaving room for a variety of solutions to the same problem and for final products in a variety of formats.

Student roles and tasks. Reinforce that during the process, students will need to play a wide variety of roles. They will be researchers, scientists, writers, interviewers, and information producers and publishers. They will be photographers, videographers, scriptwriters, and actors. Ultimately, they will be agents for change. Some of these roles will be new to them; reassure them that you will help them succeed.

Explain also that throughout the Challenge Based Learning process, you will serve as a project manager and mentor to answer questions, provide examples of such things as lists of guiding questions, activities, and resources, and lists of possible solutions to a challenge.

Teamwork. To help students become comfortable in their groups, provide guidelines for how to divide the work and give students tools to make meaningful contributions to the success of the team. For example, schedule class time to work on skills such as conflict resolution and attentive listening. Establish a safe space where groups can air issues they are having, and encourage them to work out differences in a positive way. Have each group draw up a contract or outline that clearly states team member roles and perhaps even rules for group discussions that are developed by the students themselves.

Schedule expectations. By now, students will want to know how much time they will have to do all the work that has been outlined. Be very clear about the time frame: Do they have a week? Four weeks? Provide a scheduling template that gives a general idea of when each stage of the process should begin and end.

Stage 2: Setting the Foundation for the Solution

During the second stage of the process, students identify the guiding questions (what they need to know) and identify resources and activities to answer their questions. Remind them that they have many options for their guiding activities and resources: they can use the Internet, the school or public library, their social networks, or interview local experts in person or experts located anywhere in the world via the web.

Guiding questions. Armed with the big idea, the essential question, and the challenge, your students can now generate their own guiding questions to identify the knowledge they will need to understand to develop a solution to the challenge. For example, if the big idea is water, guiding questions might include: How do we use water? How much water do we use? How is water wasted? How much water is wasted? How can water be conserved? Where does water come from? This is a critical phase of the Challenge Based Learning process. Make sure the students develop an extensive list of guiding questions as this will guide their learning and ultimately the validity of their solutions.

For Younger Students

Depending on your students' grade level and skills, you may want to preselect websites that are at an appropriate reading level for them. You should approve research sources and preselect them where appropriate.

Guiding activities. Next, the students identify and engage in guiding activities, including simulations, research, games, calculations, expert interviews, surveys, and other activities that help them acquire the knowledge needed to answer the guiding questions and to develop an innovative, insightful, and realistic solution. Guiding activities might include: searching the web for basic information about water and the top issues about water; having a video chat with a representative from the local water district to identify ways to reduce water consumption; calculating how much water they and their families use with the H_2O calculator available from the National Wildlife Foundation; or using the Surf Your Watershed site provided by the U.S. Environmental Protection Agency to locate the community's watershed.

Guiding resources. Explain to students that guiding resources need to connect to their questions and activities. For example, if one of the questions is "How much water does our school use?," sources might include interviewing administrative personnel at the school or in the city's utilities division.

You can support your students' work by offering guiding resources, a focused set of relevant and credible resources that you have chosen that might include podcasts, websites, videos, databases, contact information for experts, and other types of content that will be helpful during these stages.

Tips for Stage 2

Guiding questions. To get started with guiding questions, ask students to brainstorm everything they know about the challenge and what they still need to discover to find a solution to their challenge. Ask them what they are curious about and what kinds of facts will help them make "before" and "after" measurements. Also ask them to identity the real-world jobs, departments, or offices that deal with issues related to their questions so they have places to go and people to talk to during their research. While it is important to allow the students to come up with their own questions, showing them a sample set is helpful. Make sure that they conduct thorough and thoughtful research as this sets the foundation for determining an suitable solution. Discourage the tendency to rush to a solution or to adopt the first solution that they identify.

Guiding activities. For help with guiding activities, suggest the following steps:

Good Idea

Have students utilize their social networks to expand their research beyond their local community.

- Have students create a three-column matrix with their guiding questions in the first column and activities/resources in the second column that will help them answer the questions. After the activities are completed, the results are placed in the third column. For a sample layout for this document, see "Guiding Questions, Resources, and Activities Matrix," in the "Resources" section later in this document.

- List everything they already know about the topic, then use Internet research to identify current topic-related issues to add to their knowledge base.

- Do local research to discover the particular issues, advantages, disadvantages, needs, and aspects of their community connected to the topic, using local papers, public offices, and interviews of key community persons.

- Conduct surveys and opinion polls that can be used to gather information from the stakeholders.

- Expand their scope to include interviews or interactions with experts from around the world. Help students identify people and help them make contact via the Internet.

- Identify their own personal connection with the topic; for instance, each student calculates how much paper, water, or fuel he or she uses, keeps track of food consumption over a period of time, or interviews family members to find out about his or her family's experiences with community or cultural issues.

Provide (just) enough structure. Challenge Based Learning is meant to be a free flowing stage in which students are allowed to search, struggle, re-focus, and learn through making mistakes. The amount of structure that you need to provide depends on the maturity of the students. Give them freedom to explore, but make sure there are boundaries so they do not get lost.

Stage 3: Identifying a Solution

Good Idea

Remind students that they will be implementing the solution, so it should be something they can do with the time and resources available.

Having thoroughly researched the guiding questions, the students now have a solid foundation to begin identifying a variety of possible solutions. They should select one solution through prototyping, experimentation, or other means. Next, they fully research, document, and develop that solution and then identify steps to carry out their implementation plan.

Although the exploration of the challenge will lend itself to multiple solutions, each group needs to select a single solution to develop and implement. Encourage them to use prototypes, descriptions, or sketches to select a single solution per group. The group continues to develop this solution, including listing action steps, needed materials and where they will obtain them, responsibilities for each group member, any relevant timing considerations, how success will be measured, and so on. All of these decisions are organized into a work plan. Along the way, students begin to plan how they want to implement and document their solution and identify the appropriate audiences.

Tips for Stage 3

Brainstorm, select, and plan solutions. Coming up with and considering many solutions before selecting one is a key element of Challenge Based Learning.

The solution. The solution they choose may involve a campaign to inform and/or convince family, peers, or community members about the need for change; specific steps that could be taken to address their challenge on an ongoing basis; school or community improvement projects; and other activities. Encourage the students to be creative in designing and carrying out their solutions and to document their activities.

Releases. You may need to obtain certain releases, either from parents, community members, or other students if your students will film them (such as for interviews or to produce a video project). A parental release form also may be needed for students who are to appear in videos. Check with your school administrative offices to see if policies are in place that you should follow.

Stage 4: Implementation and Evaluation

After identifying their solutions, the students will implement them, measure outcomes, reflect on what worked and what didn't, and determine whether they made progress in addressing the challenge. When implementation is complete, students share their work with the rest of the world.

In their research plan, the students decide what they will measure and how often so they can be consistent throughout the implementation phase. For instance, if the challenge is to reduce the school's paper footprint, they might want to keep track of how much paper is used per day. Once they decide what to measure, the students can determine a baseline by taking current measurements over a few days or a week. Students should also choose the method or methods they will use to capture the information. For example, if they are reducing the school's paper use, will the team personally check to see how much paper is used? Will they rely on surveys or

questionnaires? Will they interview people? They may even take photos or video to illustrate ways paper is being used.

Creating this plan at the beginning will help the team members collect similar data that can be compared throughout the process. The teams can make a notebook or set up an online workspace to record measurements every hour, day, or week (or whatever frequency they decide on). If they will use surveys or questionnaires, students will need prepare the questions and determine the delivery method. If students will interview people, they need to write questions and set up the logistics for the interviews.

Once the trial period is over, students conduct the final measurements (observations, surveys, interviews, and so on) at the times they have determined. Encourage them to consider collecting information right after your trial period ends and some more a few days later. They will get a better idea of whether people's habits actually changed as a result of the solution.

When students have collected all of their data, they begin the analysis process. Did anything change? Did it change the way they had hoped? In addition to comparing the beginning and ending data, the students can look for trends. When did the biggest change take place? What can they say about how people behaved at different times during the trial? Using this information, they can determine and explain whether the solution had the desired effect.

Best Practice

Provide adequate time for implementation and observation.

Tips for Stage 4

Keep everyone informed. Some of the students' solutions will involve activities outside of normal classroom hours and beyond the boundaries of your school. At the start of the process, inform parents that you are taking your students through a process of Challenge Based Learning so they are not surprised if their students need help from them to connect with resources in the community. Ask for parent volunteers to assist in ensuring that all students have the support they need to complete their solutions.

Provide examples of data. Throughout the process provide students with examples of different types of data. Help them to understand the difference between quantitative and qualitative data. This is a good time to get the math teachers involved if they are not already.

Data collection tools. Which tool (or tools) that the students select for collecting data is critical for analyzing the success of their solution. Spend some time going through the different types of collection tools along with their advantages and disadvantages. iWork, which includes Pages and Numbers, is great for collecting and analyzing data. You can also use MobileMe or Snow Leopard Server to share the files among the team members.

Use technology. Mobile and web-based technologies have made data collection, analysis, and visualization easier than ever. Use these tools to extend the breadth and depth of the research efforts.

Stage 5: Publishing Results and Reflections

Throughout the project students document their experience using audio, video, and photography. Near the culmination of the challenge, students build their solution video and record their reflections. The three-to-five minute solution video should include a description of the challenge, a brief description of the learning process, the solution, and the results of the implementation.

Students are encouraged to keep individual written, audio, or video journals throughout the process. As a culminating event, students can be provided a series of prompts for final reflections about what they learned about the subject matter and the process.

The solution video, reflection videos, and any supporting documents can be shared with the world through web-based communities. It is also a good practice to have a public event with all of the participants at the school or in the community to celebrate their efforts and thank those who have assisted.

Tips for Stage 5

Provide resources and examples. Have your students explore the growing set of solution videos available on the web to get a sense of what they are expected to produce. Have them develop storyboards and scripts prior to editing the video.

Plan ahead. When students reach the publishing step, they will want to have a large amount of media to work with when creating their solutions video. Encourage students to create media collection plans for all portions of the challenge process.

Keep organized. Create a common naming convention for folders and media files. The video creation process will be much easier if all media is organized and easily accessible. Emphasize the importance of developing a storyboard and script before they create the video.

Best Practice

The solution and reflection videos should be shared with your local community and the world.

Frequently Asked Questions

My school does not make a computer and/or a mobile device available for every student. Can I still use Challenge Based Learning?

Yes. Build extra time into your schedule to allow students to access school computers during class, especially during the research phase and while students create their presentations. Consider allowing students to use their personal technology.

I would like to try Challenge Based Learning, but my schedule is very tight. Can I fit this into a week's worth of classes?

Yes. A challenge can be completed in as much or as little time as you would like. You will still choose the big idea, the essential question, and the challenge. Also, make sure that the challenge you design for your students is one they can address in the amount of available time. You also need to streamline certain stages of the process. For example, while students still work in groups to develop guiding questions, do research, propose solutions, and create a final product, the implementation of the challenge can be limited to individual students working on their own. But remember, when students engage in this type of learning, they don't want to stop working on their projects when the school day is over. Explore ways in which you can help your students continue working beyond the school day.

Do I need to collaborate with other teachers at my school, or can I "go it alone"?

Collaboration with other teachers is a best practice for Challenge Based Learning. It helps ensure that the content is multidisciplinary and it allows for students to immerse themselves in content and draw connections between subjects. However, a single teacher and a single class can successfully complete a challenge. You can also collaborate virtually with teachers in other schools in your community or beyond.

I'm concerned about whether my students will master the material they need to know. They have statewide tests coming up. How can I be sure they will learn what they need through Challenge Based Learning?

As the teachers in the pilots found, the Challenge Based Learning process lends itself to content mastery. By the end of the pilot, nearly every teacher observed that students had mastered the content well beyond expectations. Many felt that the depth of student learning was remarkable, in fact, much greater than anticipated. Students engaged with the content, worked harder than expected, and demonstrated good critical thinking and collaboration skills. Your task as a teacher is to facilitate this by starting with standards-based content and connecting it to 21st century content and skills throughout the process. Build basic skill practice into the activities and students will see a purpose for gaining the skills.

Some of my students don't even want to be in school. How can I get them to feel engaged in this?

The research study found that even students who tended to disengage from school were excited and interested in Challenge Based Learning. Because it connects schoolwork with real life, and because it is structured so differently from what many students are used to, Challenge Based Learning is engaging, even for at-risk students. Your task as a teacher is to present the process and especially the challenge in a real-world context and in an involving and motivating way.

I have students who can't read. How can they do research?

You can use cooperative and multigrade groupings in which students can work with each other to find and discuss research. Bring experts to your classroom so students can listen. Take advantage of the many video resources that exist on the web so students can watch, listen, and learn. Enable the text-to-speech feature of the Mac OS.

Where can I learn more about Challenge Based Learning?

Visit the Challenge Based Learning website for tips, suggestions for big ideas and challenges, additional descriptions of the pilot program, and more. The site is available at www.challengebasedlearning.org.

Setting the Stage

Setting a solid foundation for the Challenge Based Learning experience is critical for a successful experience. The resources in this section will assist in organizing the process, keeping student teams on track, and getting started with big ideas.

These resources have been developed and contributed by educators who have participated in Challenge Based Learning efforts at all grade levels. They are offered not as required documents but as ideas available for you to use and to adapt to meet your particular needs. As you create new resources, please share them with the Challenge Based Learning community.

- **Big Ideas and Essential Questions**—A collection of big ideas to start your thinking. Remember to also explore your local community for big ideas.
- **Preparation Checklist**—A document designed to assist with preparing for the Challenge Based Learning experience.
- **CBL Timeline Template**—A tool for planning and keeping track of the process. It is important to set clear deadlines for the process and products.

Big Ideas and Essential Questions

The world is full of potential challenges. Read the news, talk with community leaders, connect with college and university faculty, visit iTunes U, and so on. As you and your students explore big ideas and essential questions, keep in mind your district and school curriculum, community issues/needs, and student interest. Addressing all of these needs will result in a more meaningful and educational Challenge Based Learning experience.

Health

- What kind of snack/drinks would be best during the morning school session?
- How can we protect children from the spread of disease?
- What can be done about childhood obesity?

Education

- How do we make school more engaging?
- How do we prepare to compete in a global economy?
- What is the purpose of education?

Relationships

- How do we stop bullying on the playground?
- How do we build communities beyond cliques?
- How can we cross cultural boundaries?

Environment

- How do we reduce air pollution?
- What is the impact of water pollution?
- Why is preserving wilderness important?

History

- How do we preserve historical sites?
- How can we honor our veterans?
- How do we honor the contributions of diverse cultures?

Citizenship

- Why is citizenship important?
- How do we get the best and brightest to serve?
- How can we have equitable elections?

Sustainability

- How can we consume less?
- How can we reduce our carbon footprint?
- How can we reduce our paper consumption?

Diversity

- Why is diversity important?
- What role does diversity play in our school or community?
- How do we respect and value diversity?

Preparation Checklist

A variety of items need to be considered when you embark on a Challenge Based Learning experience. Depending on the circumstances surrounding your challenge, you may not need to consider all of these items or may need to add others.

☐ Read the Challenge Based Learning Classroom Guide and explore the website.

☐ Identify partners in other academic areas to work with. Meet with them to review the CBL process and discuss how to work together.

☐ Discuss the CBL process with your supervisor.

☐ Secure the needed permissions if your students will be leaving the school or working with community partners.

☐ Present the concept to parents.

☐ Set up or identify the online collaborative environment your students will use during the process.*

☐ Complete a timeline and student contract documents.

☐ Analyze your curriculum scope and sequence and standards to determine how the challenge could fit.*

☐ Analyze your schedule to determine how time will be used.

☐ Research potential big ideas from a local and global viewpoint.*

☐ Determine how to introduce your students to the CBL process.

☐ Provide students with skills they will need for the challenge (group work, research, technical).

☐ Determine the potential student deliverables and how they will be assessed. *

☐ Determine what technology is available for your students:

      Computer (MacBook, iMac)

      Video camera (iPod touch, iPhone, or built-in iSight camera on MacBook or iMac)

      Digital camera (iPod touch or iPhone)

      Audio capture (iPod touch and earphones with microphone)

      Online research (iTunes U, iPad, apps)

☐ Identify the big idea.*

☐ Identify the essential question.*

☐ Identify the challenge.*

*Can be done ahead of time without students or with the students as a part of the process

CBL Timeline Template

Fill in due dates for each stage of the challenge.

Stage	Dates
Stage 1: From Big Idea to Challenge	
Understanding the Big Idea and Essential Question	
Create and/or Accept the Challenge	
Create Challenge Proposal Video	
Create Solution Teams/Explore Roles	
Stage 2: Setting the Foundation	
Develop Guiding Questions, Activities, Resources	
Researching Answers to Guiding Questions	
Brainstorming Solutions	
Stage 3: Identifying the Solution	
Initial Testing of Solution Prototypes	
Final Solution Presentation	
Stage 4: Implementation and Evaluation	
Implementation Plan	
Solution Implementation	
Data Analysis and Presentation	
Stage 5: Publishing Results and Reflections	
Solution Video	
Reflection Videos	

Standards and Assessment

National and state standards should be considered when you implement Challenge Based Learning. Fortunately, the open architecture of CBL enables teachers and students to develop challenges that address all standards and allows for multiple methods of assessment. This section provides ideas from other educators how to address standards, sample rubrics for CBL, and assessment ideas.

These resources have been developed and contributed by teachers who have participated in Challenge Based Learning efforts at all grade levels. They are not offered as required documents but as ideas that you can use and adapt to meet your particular needs. As you create new resources, please share them with the Challenge Based Learning community.

- **Thoughts on Standards**—Teachers who are implementing CBL explore the role of standards and provide ideas for addressing them.
- **Sample CBL Rubric**—A general rubric covering the entire CBL process.
- **Assessment Ideas**—A list of ideas for how to build assessment into the Challenge Based Learning experience.

Thoughts on Standards

Standards and assessment are at the forefront of the current educational landscape. Challenge Based Learning is a flexible approach to teaching and learning that allows for all standards to be integrated into the experience. The question is not whether standards are considered but how, when, by whom, and for what purpose. The following quotes explore the role of standards within the Challenge Based Learning experience and are provided to stimulate discussion.

As a teacher, CBL allows me to cover more standards in less time. In addition, my students get to experience the standards in a real-world setting. The familiar context of the naturally inter-connected world lets students make meaning that is relevant to their lives. I have found that this is much more difficult to accomplish with isolated lessons. From a standards perspective, the CBL model lets me cover more standards in a more meaningful way.

Paul Devoto
Apple Distinguished Educator
San Juan Unified School District
Carmichael, CA

When implementing our first CBL lessons, we took a different approach in regards to how to address our state and local standards and benchmarks in the different subject areas. We just conducted our unit and then analyzed the unit to see which state and local standards were covered. We were amazed at the variety of standards that were covered by our CBL units, not only in the subject area that conducted the units, but other curricular areas also. The district administrators were pleasantly surprised by this discovery.

Bob Lee
Apple Distinguished Educator
Pratt USD 382
Pratt, KS

Traditionally, the teacher identifies and creates lessons to address the standards. This is a top-down experience. The burden is on the teacher—regardless if the students know it or learn it. There's no buy-in from the students to connect with the standards. Another approach is to present a big idea to the students like: healthcare in the U.S. Create an essential question like, how does the healthcare crisis affect me and my community? The challenge is to improve healthcare in our community. With this context, students are asked to identify standards not only in their immediate course of study, but what standards from their other classes can be addressed and met.

Start out by helping the students understand what the standards are and help them to see them as critical ingredients to the journey of learning and NOT make them out to be the journey. Have them read them, reword them, and make connections to what they are studying. Post them on a blog, wiki, or shared document for future use and reference. Collect this data via text, audio, or video along the way. Don't wait until the end to collect this valuable and empirical evidence that YOU ARE COVERING THE STANDARDS. This process of locating the appropriate standards can be part of the guided questions and activities. Giving the students the opportunity to be involved in the planning is key to CONNECTING them to the learning goals and process. In the end, this makes so much more sense to everyone involved.

Marco Torres
Apple Distinguished Educator
Los Angeles, CA

Through the CBL process we cannot only meet standards for various math topics, but make real-world connections so students are actually extending their understanding and exceeding the standard to a performance level. CBL in the math classroom can be challenging but once teachers see students internalize and apply the mathematics rather than listen and repeat, they will see that standards are not only addressed but mastered.

Julie Garcia
Apple Distinguished Educator
San Diego Unified School District

Often educators express concern regarding utilizing the CBL model and meeting the standards expected by their institutions. My response and advice is that if the teacher guides the project and facilitates the learning around topics that are embedded in their curriculum (and in the standards), the standards can and will be met. In fact, because students are so engaged in this authentic learning strategy, they often learn so much more. And, because the learning is meaningful and applicable in the "real world," they gain a deeper understanding of the content. By developing the big idea and essential questions in ways that match the curriculum standards, CBL absolutely is an effective and extremely successful instructional strategy.

Julene Reed
Apple Distinguished Educator
St. George's Independent School
Collierville, TN

Since working with Challenge Based Learning with teachers and students, I have witnessed students go above and beyond the set of expectations teachers have set for them, time and time again. This framework in action demonstrates students far exceed the status quo due to them having an ownership in the learning process. When teachers take the time to reflect on the amount of erudition occurring during CBL, they will notice that they set the new standard of learning—24/7/365.

Holly Ludgate
Program Director, Education
Media Design & Technology
Masters Program
Full Sail University
Winter Park, FL

Challenge Based Learning is the easiest and best way for students to meet and exceed the standards. Challenge Based Learning allows me to align the standards with real-world projects that my students are naturally interested in and love to create.

John Gulick
Apple Distinguished Educator
San Marino Unified School District
Pasadena, CA

I used a "democracy" challenge with my Advanced Placement course in U.S. Government and Politics. In order for certification by the College Board as an official AP course, a teacher must submit a detailed syllabus, demonstrating that specific course content will be covered. Our CBL process allowed us to meet two important benchmarks—"Foundations of American Government" and "Voting Behavior." The depth of learning achieved in these areas was outstanding. This level of understanding translates extremely well to the short response section of the AP exam. Over half of the class ultimately received the top score of "5" from the College Board, and I am confident that CBL contributed to their success rate.

Larry Baker
Teacher
Mercy High School
Farmington Hills, MI

Sample CBL Rubric

This rubric can be used by teachers and students as they move through the challenge process. Remember that there are multiple entry points into the process. Students may or may not be involved in the first three steps and the rubric can be adapted as needed.

	Beginning	Developing	Exemplary
Big Idea	Demonstrates significance.	Demonstrates global significance and includes local impact.	Demonstrates global and local significance. Is meaningful to the participants and their community.
Essential Question	Multiple questions.	Identifies what is important to know about the big idea. Refines and contextualizes that idea.	Identifies what is important to know about the big idea. Refines and contextualizes that idea. Clear, concise, and answerable question.
The Challenge	A natural extension of the essential question. Phrased as a "real-world" challenge.	A natural extension of the essential question. Phrased as a "real-world" challenge. Can lead to an implementable and measurable solution.	A natural extension of the essential question. Phrased as a "real-world" challenge. Can lead to an implementable and measurable solution. Presented in a clear and compelling short video.
Guiding Questions	Narrow set of questions.	Extensive set representing what is needed to learn in order to identify a solution to the challenge.	Extensive set representing what is needed to learn to identify a solution to the challenge. Aligned with state and national standards.
Guiding Activities	A range of activities primarily within the classroom.	A wide range of activities both inside and outside of class that help to answer the guiding questions. Sets the foundation for an innovative, insightful, and realistic solution.	A wide range of activities both inside and outside of the class that help to answer the guiding questions. Sets the foundation for an innovative, insightful, and realistic solution. Aligned with state and national standards.
Guiding Resources	Sources are reliable and accurate.	Sources are reliable and accurate. Represent a wide variety of perspectives.	Sources are reliable and accurate. Represent a wide variety of perspectives. Include interaction with local, national, and/or international experts.
Solution	Solution shows evidence of careful research and deliberation.	Solution shows evidence of careful research and deliberation. Can be implemented by the students in their community.	Solution shows evidence of careful research and deliberation. Can be implemented by the students in their community. Involves partnerships with groups outside of the school.
Implementation	Solution is implemented with a specific audience for a specified amount of time.	Follows a detailed implementation and evaluation plan. Solution is implemented with a specific audience for a specified amount of time with some data collection.	Follows a detailed implementation and evaluation plan. Solution is implemented with a specific audience for a specified amount of time and includes extensive data collection.
Evaluation	Conclusions are drawn using the data generated from the implementation.	Conclusions are drawn using the data generated from the implementation. Findings are presented in a clear and compelling manner in a written report.	Conclusions are drawn using the data generated from the implementation. Findings are presented in a clear and compelling manner in a written report and a short video.
Reflection	Clear and concise perspectives on what was learned about the topic, specific content, and process presented in classroom discussions.	Clear and concise perspectives on what was learned about the topic, specific content, and process presented in written journals.	Clear and concise perspectives on what was learned about the topic, specific content, and process presented in written and video journals.

Assessment Ideas

Challenge Based Learning presents a wide variety of opportunities for assessment. Informative assessment of content and skills can be built in throughout the challenge, and the solutions to the challenge provide an excellent opportunity for summative assessment. Traditional assessment methods can be used at many different points during the process. However, the CBL experience provides the opportunity to integrate a variety of alternative and authentic assessment tools. These tools are performance based in that students are not only expected to know the information but apply it in real-world situations. They also provide a longitudinal source of rich data that can be used to assess depth of knowledge and change over time. The following are some ideas for assessment that can be conducted during the challenge.

Rubrics for products and process. Create or adapt existing rubrics for each of the products and processes that are included in the challenge. An overall CBL assessment rubric is included in this section.

Learning logs, journals, and blogs. Throughout the CBL experience students will have many chances to document their learning through writing, audio, and video. A longitudinal collection of these materials provides for the assessment of learning over time.

Project prospectus/business plan. Depending on the nature of the solution, teams may have the opportunity to develop a prospectus or business plan that can be used to build stakeholder interest in the plan or raise capital for funding the solution. This is an excellent, "real-world" skill for students to acquire and an excellent way to measure their depth of understanding of both the challenge and its solution.

Peer presentations. Using any of the current models for rapid fire presentations (such as TEDTalks or www.pecha-kucha.org), you can assess student knowledge and skills through a series of presentations to their peers. The format forces students to be grounded in their content, concise, and clear without relying on notes or reading their slides. This is a quick and exciting way to see what your students know and can do.

Stakeholder presentations. Having student teams present their solution proposals to actual stakeholders provides a rich opportunity to assess their comprehension of the content. It also allows for the assessment of 21st century and technology skills.

Evaluations. Creating job descriptions and assigning the roles to team members results in the opportunity to conduct job evaluation similar to a real-world setting. Based on their roles and responsibilities, the students can set goals and be evaluated on whether they met them.

Conferences. Frequent conferences with the teams in which they report on their progress allow for informative assessment of both content and skills. These conferences can be face to face or virtual using any of the free communication tools available, including iChat.

Products. During the CBL experience, students will have the chance to develop many concrete products from plans to videos. Each product provides a rich opportunity for assessment using checklists and rubrics.

Self-evaluations. Throughout the CBL process, students can be provided with opportunities for self-assessment. These can take place in many formats including private blogs, wikis, audio, and video. The self-evaluation process can run parallel to peer and job evaluations.

Supporting the Process

The CBL process provides students the freedom to think freely, learn, plan, fail, succeed, evaluate, and try again as they move toward the implementation of a solution. A large part of the teacher's responsibility is creating organizational scaffolding for the learning experience. The materials in this section are examples of resources that can be used to support the process and move it to a successful conclusion.

- **Roles and Responsibilities**—A list of potential roles for students that will support the process. In most cases, students will play multiple roles throughout the challenge.
- **Guiding Questions, Resources, and Activities Matrix**—A resource for students to collect guiding questions, list corresponding activities/resources, and record their findings.
- **Group Challenge Guide**—A tool for teams to use to organize, track, and document their efforts. The form can be expanded or moved to a digital format for easy updating. This is a great way for teachers to keep track and assess student effort.
- **Technology Guide**—A guide for how technology can be used to support the CBL process.
- **Reflection Prompts**—Students should be encouraged to capture their reflections throughout the process. Reflections can be captured via text, audio recording, or video recording. This section provides ideas for reflection prompts that can be used throughout the process.
- **Team Contract—**A resource to use with each team to document that they understand the responsibilities of working in a team, their individual roles, and the due dates for products.

Roles and Responsibilities

The open framework and group work format for Challenge Based Learning make it important to create some structure for the participants. One way to to this is to make sure that the students understand the potential roles they can play in the process. This list is not meant to be prescriptive or definitive as the type of roles needed will depend on the nature of the challenge and the personalities and skills of your students. Students can, and probably should, have the opportunity to assume multiple roles during the process. Also, more than one student may be assigned the same role; for example, there may be more than one Research Librarian. Students will learn from each other throughout the process, allowing them to gain new skills in areas in which they may not have prior experience.

Project Manager—Manages the overall process, including keeping track of progress toward meeting project deadlines, team productivity, team morale, and so on.

Documentarian—Develops a structure and strategy for documenting the entire CBL experience through text, audio, and video. Works closely with the production team to capture key events.

Media Specialist—Manages the production process for all of the media captured during the process. Plans how best to capture, edit, organize, and distribute the media assets.

Product Manager—Responsible for managing the final deliverables including presentations, print materials, web products, videos, and so on.

Research Librarian—Manages the development of guiding questions as well as the process and resources necessary for answering them. Collects and organizes content from the researchers. Works with the teacher to organize directed learning experiences and guest lectures when appropriate.

Researcher—Works with the Research Librarian to identify activities and gather resources for answering the guiding questions. Assists with documentation and sharing of the answers.

Public Relations/Marketing Director—Keeps all of the stakeholders informed about the CBL process. Keeps the school, home, and local community up to date on progress and events. With the assistance of school officials handles any inquiries from the community. Creates any necessary marketing materials for the solution.

Social Media/Collaboration Director—Manages the private and public online communities for the project. Works closely with the teacher and other directors to ensure that an online space is available for collaboration and documentation. Recommends, approves, and manages the use of public environments, including social networking and video distribution sites.

Guiding Questions, Resources, and Activities Matrix

Guiding Questions (What we need to learn)	Guiding Activities and Resources (How we will learn it)	Results (What we learned)
Example: How much paper does the school use in a week?	*Example: Monitor the copy machines and printers for a week.*	*Example: The school printers and copiers use X number of sheets a week.*

Group Challenge Guide

The Big Idea: _____

The Essential Question: _____

The Challenge: _____

Group Members and Roles/Responsibilities

(Possibilities include project manager, product manager, public relations, media specialist, documentarian, add any other jobs that our group will need)

Name Roles/Responsibilities

1. _____

2. _____

3. _____

4. _____

5. _____

Our Guiding Questions

(Questions we need to answer—what we think we need to know to find a solution)

_____

_____

_____

_____

Our Guiding Activities

(Learning activities, research, experimentation, interviewing, exploring—how we will get information)

_____

_____

_____

_____

_____

Our Guiding Resources

(Websites, podcasts, movies, people, tools—sources we can access to find information)

_____

_____

_____

_____

Training

(Skills we need and our professional development plan—could include video production, interviewing techniques, and so on)

_____

_____

_____

_____

_____

_____

Our Production Schedule

(Events we want to record, what format, necessary resources, and dates)

_____

_____

_____

_____

_____

_____

Things We've Learned—and How We Learned Them

(Important information about the big idea and the challenge—keep a running list on another sheet or on a wiki)

_____

_____

_____

_____

_____

_____

Technology Guide

Technology allows students to connect deeply with their subject matter and involve them in an engaging, collaborative real-world learning experience. During the Challenge Based Learning, technology provides the tools needed to set the stage, support the process, publish, and reflect on the process.

1. **Setting the stage**
   - The collaborative, 24/7 nature of CBL makes technology critical. The iWork suite of tools provides an exceptional resource for organizing and presenting information. Snow Leopard Server can be used to take the CBL process online through safe and secure access to email, chat, calendars, wikis, blogs, and more.
   - Students and teachers can use the rich browsing and navigation tools integrated into Safari, including its built-in RSS tools, to keep track of world and community events that can become the next big idea, essential question, and challenge. iTunes U also provides a rich source of big ideas through its large collection of presentations from some of the brightest minds of the world.

2. **Supporting the Process**
   a. Mobile technologies like iPhone, iPad, and iPod touch allow the students to take their search for a solution into the field. No matter where students are, needed resources, communication tools, and data collection tools are available. They can search the web, access content on iTunes U, record an interview, video an event, and much more.

   b. When working with community members and other stakeholders, students can present their ideas using the rich tools in the iWork suite. Collect and visualize data using Numbers. Create professional letters of introduction, business plans, and reports with Pages. Impress an audience with polished slides to accompany a pitch or presentation with Keynote.

   c. The wiki, MobileMe, iWork.com, and iWeb can be used to share resources, distribute information, and follow the progress of the teams.

3. **Publishing**
   a. Video cameras and iMovie can be used to create an engaging video to present a challenge or a solution to the world.

   b. Throughout the process, the students should be collecting all types of media to support their research, implementation, reports, and solution video. The iPhone and iPod touch are powerful tools for capturing this content, and iPhoto provides an easy way to organize the images.

4. **Reflection**
   a. Students can use the wiki feature in Mac OS X Snow Leopard Server to capture both individual and team reflection about the content, process, and results. These reflections provide an excellent source of data for informative assessment.

   b. The built-in iSight camera on MacBook and iMac and Photo Booth offer a simple yet powerful way to collect student reflections on a regular basis.

Reflection Prompts

Student reflections can be answered by students via text, audio recording, or video recording. An easy way to do this is to use Photo Booth on your Mac.

Understanding the Challenge
- Explain the big idea, essential question, and the challenge.
- Why is this important to you and your community?
- Who does the challenge impact?

Guiding Questions/Research
- What were the most valuable guiding questions?
- What kinds of surprises did you encounter during your research?
- What resources were the most valuable?

The Solution
- Describe the process your team went through to come to your solution.
- What things did you try that didn't seem to work?
- Why do you think your solution will make a difference?

Executing the Solution
- How did you put your solution into action?
- How did you measure its effectiveness?
- What obstacles did you face during this process?

Teamwork
- What challenges did you face working as a team?
- How did your group utilize individual talents?
- What have you learned about collaboration?

Review of Your Work
- Could you have solved this challenge differently?
- What would you do differently if you were to take on this challenge again?
- What is one thing you learned that you will never forget?

Connections
- What did you learn during this process that you didn't know before?
- How can you apply this process and/or your solution to other similar challenges in the world today?
- What skills did you learn that apply to other areas of your learning?

CBL Team Contract

Big Idea: _____   **Team Name:** _____

Essential Question: _____

Challenge: _____

Your group will work together during a Challenge Based Learning experience. To be an effective group member, it is important that you agree to certain group expectations. Read the team policies below. If you agree with the policies, sign your name to indicate your agreement. If your team decides other policies should be included, list them on this sheet before you sign.

- **Compromise**—At times you might not get your way, so you need to know when to give in.
- **Cooperate**—Group members are expected to work with the group, not put up roadblocks that will keep things from happening.
- **Collaborate**—Work with your group members to come to a consensus.
- **Commit**—Put all your effort into this project and do all your work.
- **Communicate**—Speak up within the group and be willing to share your ideas; they may be brilliant. Make sure group members understand what is being said.
- **Consideration**—Be considerate of others' feelings. When you disagree with others, don't make it personal. You can dislike an idea, but calling the idea or the person "dumb" is not acceptable.
- **Coexist**—Get along with one another. If your group has trouble getting along, ask a teacher or advisor to help.

Team Member	Roles and Responsibilities

Due Date	Product

Team Signatures:

_____

_____

_____

_____

_____

_____

Publishing

An important element in the Challenge Based Learning experience is publishing. This allows the students to share their challenges, solutions, and reflections with a local and global audience. This section provides resources to assist with the publishing process.

• **Challenge Proposal Storyboard**—A template for developing a storyboard for a challenge proposal video. This short video informs users about the challenge and serves as a call to action for the participants.

• **Solution Storyboard**—A template for developing a storyboard for a challenge proposal video. This three-to-five minute documentary video tells the story of how the group moved from the challenge to the implementation of their solution.

• **Video Specifications**—Technical information for preparing your videos for archiving and posting to the web.

Challenge Proposal Storyboard

This storyboard template can be used by teams to plan their challenge proposal video. Use the large box to sketch ideas, the smaller box for production notes, and the line below for dialogue.

1

Big Idea

Image or statement that grabs the viewers interest.

2

Team Info

Team name, country, state, school, grade, and so on.

3

Essential Question

Present the question of interest.

4

Significance/ Context

Why is this important to your team and their community?

5

Example

A concrete example of the significance or context.

6

The Challenge

An engaging statement of the challenge.

Solution Storyboard

This storyboard template can be used by teams to plan their solution video. Use the large box to sketch ideas, the smaller box for production notes, and the line below for dialogue.

①

Team Info

Team name, country, state, school, grade, and so on.

②

The Challenge

State the challenge within your context.

③

Process

Overview of what your group did to explore the challenge.

④

Solution

State your solution.

⑤

Implementation

Tell how, where, and with whom the solution was implemented.

⑥

Lessons Learned

Present what you learned.

Video Specifications

Once you have created your video, you need to export it. The settings you choose when you export will vary depending on how you intend to use the exported video. This guide will help you decide what settings to use.

General Guidelines

- Choose frame size first. Frame size determines the movie's file size.
- Set the number of key frames next. A higher number of key frames means a higher quality playback, but the file size will also be larger.
- Set the frame rate last. Stay between 12 and 30 frames per second. The higher the frame rate, the better quality the playback, but higher frame rates result in larger file sizes too.

Exporting to the Web

Use the following settings when exporting your video:

- Frame size/resolution: 640 x 480 (4:3) or 640 x 360 (16:9)
- Aspect ration: 4 x 3 or 16 x 9
- Frame rate: 30 frames per second
- Video format: H.264 (MP4, M4V, MOV)
- Restrict data rate to 1000 kb/sec
- Audio format: AAC or MP3
- Audio bit rate: 96 kbps
- File size: 50MB or less
- In iMovie, choose Share > Export Using QuickTime. Choose Fast Start – Compressed Header in the Prepare for Internet Streaming pop-up menu.

High-Quality Archives

- If you would like to save a high-quality copy of your video for backup or archival purposes (for example, to put on a DVD to save for your portfolio), use the following settings when exporting your video:
- Frame size/resolution: 640 x 480 (4:3) or 1280 x 720 (16:9/HD)
- Aspect ratio: 4 x 3 or 16 x 9
- Frame rate: Same as source
- Video format: AVI, MOV, or MPEG
- Audio format: MP3 or MP4
- File size and video length are less important because you will be saving the movie on a DVD.

For more information:

- For iMovie: http://support.apple.com/kb/HT3130
- For Premiere Elements: http://help.adobe.com/en_US/PremiereElements/4.0/help.html

Thank You

A special thanks to everyone who shared their thoughts, ideas, resources, and time to assist in the development of this resource. Your contributions are appreciated and will go a long way to helping others step outside the box of traditional teaching to become a learner alongside their students.

The guide is a living document and will continue to change and grow to meet the emerging needs of the CBL community.