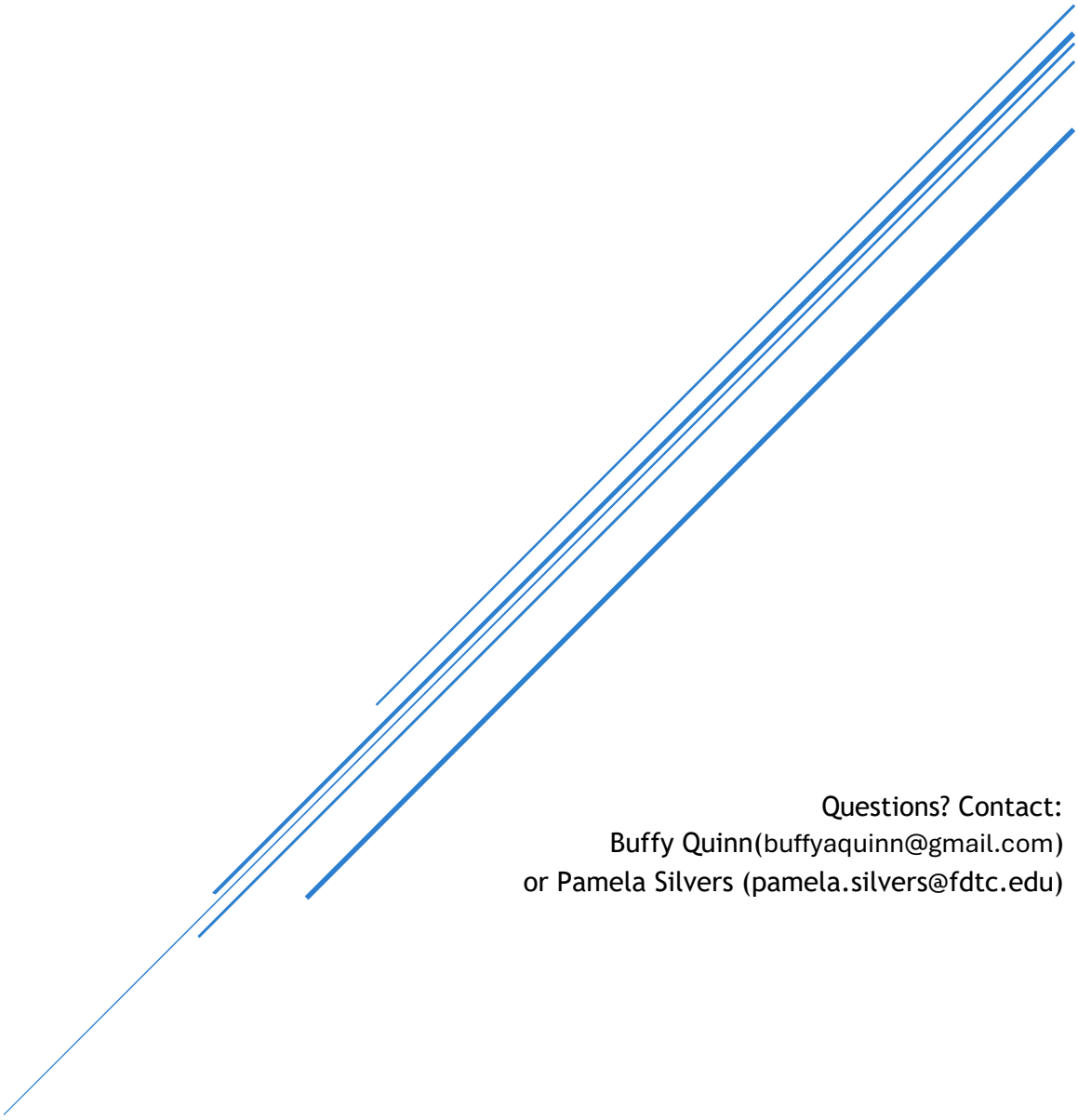
PROJECT MANAGEMENT HANDBOOK

for National Science Foundation (NSF) Advanced Technological Education (ATE) Projects



Questions? Contact:
Buffy Quinn(buffyaquinn@gmail.com)
or Pamela Silvers (pamela.silvers@fdtc.edu)

This material is based upon work created by Buffy Quinn as part of her Ed.D. capstone project focused on applying principles of project management in academic settings. It has been updated and adapted for the PI 101 cohort supported by the National Science Foundation Grant No. 2227301 (Mentor-Connect Forward: Leadership Development and Outreach for ATE). Any opinions findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

Congratulations on your ATE grant! As you embark on this exciting endeavor, we understand that navigating the complexities of turning your carefully and thoughtfully developed proposal into a project can be both thrilling and challenging. However, turning your dream into reality is doable and can be more easily accomplished with a bit of project management. This handbook is designed to serve as your trusted companion, providing you with practical guidance, best practices, and insights to help you successfully manage your NSF ATE project from start to finish.

Whether you're tasked with curriculum development, recruitment, retention, professional development, applied research, or other project activities, this handbook offers step-by-step instructions, helpful tips, and real-world examples to support you every step of the way. From creating a project schedule and allocating resources to communicating with stakeholders and managing risks, we've got you covered.

Our goal is to empower you with the knowledge, skills, and confidence needed to lead your NSF ATE project to success. As you delve into the contents of this handbook, remember that you're not alone on this journey. You have a supportive community of colleagues, mentors, and partners who are here to help you along the way. Don't hesitate to reach out for assistance or guidance whenever you need it.

We believe that by equipping yourself with the tools and strategies outlined in this handbook, you'll be well-prepared to tackle the challenges and seize the opportunities that come your way as a principal investigator and project manager. Embrace this opportunity to make a meaningful impact in advancing science and technology education, and let this handbook be your trusted guide on your journey to project success.

Thank you for your dedication and commitment to excellence in education. We wish you the best of luck on your NSF ATE project, and we're excited to see the incredible accomplishments you'll achieve!

Understanding Project Management

Project management is a disciplined approach to planning, executing, monitoring, and controlling projects to achieve specific objectives within defined constraints, such as time, budget, and resources. At its core, project management is about orchestrating a series of coordinated activities and tasks to bring a project to successful completion. It involves setting clear goals, defining scope, establishing timelines, allocating resources, managing risks, and communicating with stakeholders throughout the project lifecycle.

Importance of Project Management

Effective project management is essential for ensuring the success of any endeavor, especially for new NSF ATE grant recipients embarking on their first project. While the idea of project management may initially seem daunting, it offers invaluable benefits that can alleviate anxiety and streamline project execution. Having a well-defined plan in place not only provides a roadmap for achieving project goals but also serves as a source of confidence and reassurance for project managers and team members alike.

By implementing project management principles and practices, Principal Investigators can

1. **Ensure Accountability:** Project management helps establish clear roles, responsibilities, and expectations, ensuring that everyone involved in the project understands their contributions and commitments.
2. **Optimize Resource Allocation**: By carefully planning and allocating resources, such as funding, personnel, and equipment, project managers can maximize efficiency and minimize waste, ultimately enhancing the project's outcomes.
3. **Manage Risks Effectively:** Project management enables recipients to identify potential risks and develop strategies to mitigate them, reducing the likelihood of project delays or failures and enhancing project resilience.
4. **Enhance Stakeholder Communication**: Through regular communication and reporting, project management fosters transparency and collaboration with stakeholders, including NSF representatives, project team members, partners, and participants. You will have both internal and external stakeholders—internal stakeholders will be those working on your project who will need to be invited to meetings. External stakeholders would include your program officer, your college president, and other administrators who may just need periodic updates depending on their roles. You may want to begin by creating a list of these stakeholders indicating who you will include in meetings and those who will be updated as necessary.
5. **Improve Decision-Making**: With access to timely and accurate project data and insights, project managers can make informed decisions, identify opportunities for improvement, and adapt their strategies as needed to ensure project success.

Project management provides a structured framework for organizing, executing, and monitoring projects, offering numerous benefits for new NSF grant recipients. By embracing project management principles and practices, recipients can navigate the complexities of grant-funded projects with confidence, efficiency, and success.

Managing YOUR Project: Step by Step

Having a solid roadmap will be essential for navigating the project management landscape effectively. In the following sections, you'll find a comprehensive breakdown of project management principles and best practices, each accompanied by clear instructions, real-world examples, and helpful tips. Whether you're creating a project schedule, allocating resources, managing risks, or communicating with stakeholders, these step-by-step instructions will serve as your compass, guiding you through each stage of your project with confidence and clarity. Let's embark on this journey together, equipped with the knowledge and tools needed to make your NSF ATE project a resounding success.

By following these step-by-step instructions and leveraging project management principles, you can effectively manage your NSF-ATE-funded project and achieve its objectives within the allocated time and resources.

1. Project Initiation:

This phase involves getting the project off the ground and establishing a solid foundation for success. It includes:

- Reviewing the grant proposal and understanding its key components, such as objectives, scope, and deliverables.
- Identifying key stakeholders, including project team members, industry partners, your external evaluator, and the NSF program officer. You may also want to include the college president, provost, deans, grants office, or other administrative offices.
- Setting up an initial project kickoff meeting to introduce the project, clarify roles and responsibilities, and align expectations. You may need to have several meetings aligned to your different stakeholder groups.

In Action: As a project manager, you can schedule a virtual or in-person kickoff meeting with all relevant project stakeholders. During this meeting, you can share the project proposal, discuss its objectives, and introduce the project team members. You can also establish communication channels and outline the next steps for project planning.

2. Creating a Schedule:

Developing a detailed project schedule helps in organizing tasks, setting deadlines, and managing time effectively. It involves:

- Identifying all project tasks described in the proposal and breaking them down into smaller, manageable activities.
- Establishing realistic timelines for each task and determining dependencies between them.

- Using project management tools such as Gantt charts to visualize the schedule and track progress.

In Action: Suppose your project involves curriculum development, professional development sessions, and research activities. You can create a Gantt chart that outlines the timeline for each task, including milestones such as curriculum drafts, workshop dates, and research deadlines. This visual representation will help you and your team stay on track and prioritize tasks effectively.

See Appendix A of this handbook for more about tools to help you with scheduling.

3. Allocating Resources:

Resource allocation involves identifying and assigning the necessary resources, including funding, personnel, equipment, and materials, to support project activities. It includes:

- Assessing resource requirements based on project objectives and deliverables.
- Allocating resources effectively to ensure they are available when needed and within budget constraints.
- Developing contingency plans to address potential resource constraints or shortages.

In Action: If your project requires hiring subject matter experts to develop curriculum materials, you need to allocate funds for their salaries or stipends. You also need to allocate resources for purchasing any necessary equipment or materials for curriculum implementation. By estimating resource needs upfront and allocating resources accordingly, you can avoid delays and ensure smooth project execution.

4. Managing Risk:

Risk management involves identifying potential risks that could impact project success and developing strategies to mitigate them. Your project management plan helps you manage risks because it includes:

- Identifying and prioritizing potential risks.
- Developing risk mitigation strategies to minimize the likelihood or impact of identified risks.
- Monitoring and reviewing risks throughout the project lifecycle and adjusting strategies as needed.

In Action: Suppose one of the identified risks is the unavailability of key project personnel due to unforeseen circumstances such as a college restructuring. To mitigate this risk, you can cross-train team members or establish backup plans for critical tasks. By proactively addressing potential risks, you can minimize their impact on project outcomes and ensure project success.

5. Communicating with Stakeholders:

Effective communication with stakeholders is essential for keeping them informed and engaged throughout the project lifecycle. It involves:

- Establishing clear communication channels and protocols for sharing project updates and information.
- Providing regular updates on project progress, milestones, and any changes or challenges.
- Encouraging open and transparent communication to foster collaboration and address stakeholder concerns.

In Action: You can set up regular project status meetings with stakeholders to provide updates on progress, discuss any issues or challenges, and solicit feedback. Additionally, you can use email newsletters or project management software to share updates and important announcements. By maintaining regular communication, you can ensure that stakeholders are informed and engaged in the project.

6. Leadership:

Effective leadership is crucial for guiding the project team, fostering collaboration, and achieving project objectives. It involves:

- Providing a clear vision and direction for the project, outlining goals and expectations.
- Motivating and inspiring team members to perform at their best and overcome challenges.
- Leading by example and demonstrating professionalism, integrity, and accountability.

In Action: As a project leader, you can organize regular team meetings to communicate project goals, discuss progress, and address any concerns. You can also recognize and celebrate team achievements to boost morale and motivation. By providing strong leadership, you can create a positive team environment and inspire team members to excel.

7. Team Building:

Building a cohesive and high-performing project team is essential for achieving project success. It involves:

- Fostering a sense of trust, respect, and collaboration among team members.
- Encouraging open communication and active participation in team meetings and discussions.
- Providing opportunities for team members to develop their skills and expertise.

In Action: You can organize team-building activities such as icebreaker sessions, team lunches, or collaborative workshops to strengthen relationships and build camaraderie among team members. Additionally, you can encourage cross-functional collaboration by assigning team members to work on different aspects of the project. By investing in team building, you can create a supportive and cohesive project team that works well together.

Here are some examples of icebreakers you can use as you build your project team:

- **Two Truths and a Lie**: Each team member shares two true statements and one false statement about themselves. The rest of the team guesses which statement is the lie. This helps team members learn interesting facts about each other.
- **Human Bingo:** Create bingo cards with different traits or experiences (e.g., has traveled to another country, speaks more than one language). Team members mingle to find colleagues who match the traits and complete their cards. This encourages mingling and conversation.
- **Desert Island Scenario:** Each team member shares three items they would bring if stranded on a desert island and explains why. This reveals personal preferences and sparks interesting discussions.
- **Speed Networking:** Pair team members up for short, timed conversations (e.g., 3 minutes each). After the time is up, they switch partners. This allows everyone to have a brief, personal interaction with multiple team members.
- **Commonalities and Uniqueness:** In small groups, team members list three things they all have in common and three unique traits for each person. This activity highlights both shared interests and individual diversity within the team.

8. Monitoring and Control:

Monitoring project progress and controlling project activities are essential for ensuring that the project stays on track and achieves its objectives. It involves:

- Tracking project performance against the established schedule, milestones, and budget.
- Monitoring resource utilization and identifying any deviations or risks.
- Implementing corrective actions or adjustments as needed to address issues and keep the project on track.

In Action: You can use project management software to track project tasks, milestones, and resource allocation in real-time. Regularly review project performance metrics and compare them against the planned targets. If you notice any deviations or risks, take proactive measures to address them, such as reallocating resources or adjusting the project schedule. By closely monitoring and controlling project activities, you can minimize delays and ensure project success.

9. Closure:

Closing out includes both the activities you complete and the project itself. For each activity, you should document lessons learned. It involves:

- Conducting a review to assess activity achievements, challenges, and best practices.
- Documenting activity outcomes, including successes, failures, and recommendations for future projects.

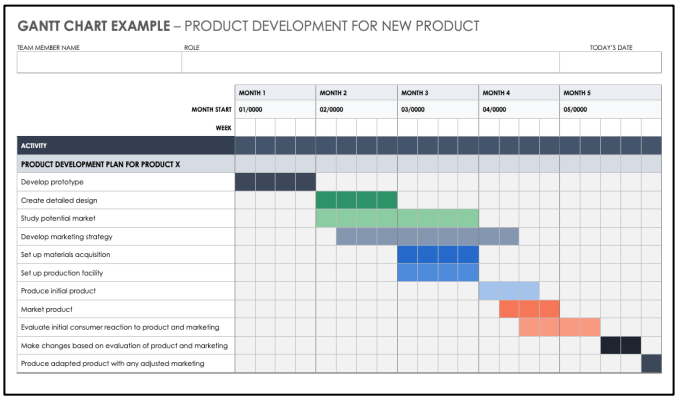
You will also have to close out the project at the end of your grant. This closure includes:

- Finalizing your external evaluator's report.
- Submitting your final report to your program officer.
- Celebrating project successes and acknowledging the contributions of team members and stakeholders.

In Action: After completing the project, you can organize a project closure meeting with stakeholders to review project outcomes, discuss lessons learned, and celebrate achievements. Prepare a final project report summarizing key findings, insights, and recommendations for future projects. Recognize and thank team members, partners, and stakeholders for their contributions to the project's success. By conducting a thorough project closure and evaluation, you can capture valuable insights and experiences to inform future projects.

Appendix A: **Gantt Charts and Tools**

The Gantt chart is a powerful project management tool that provides a visual representation of the project schedule, helping project managers plan, track, and communicate project progress effectively. It's a valuable resource for managing projects of all sizes and complexities. It provides a graphical illustration of the project's progress over time, including the start and end dates of each task, as well as their dependencies and durations.



Features of a Gantt Chart:

Task Bars: Each task or activity is represented by a horizontal bar on the chart. The length of the bar corresponds to the duration of the task, and its position on the chart indicates its start and end dates.

Dependencies: Gantt charts often include arrows or lines connecting tasks to show their dependencies. These dependencies indicate the sequence in which tasks must be completed, helping to identify critical path activities.

Milestones: Important project milestones, such as key deliverables or deadlines, are usually marked on the Gantt chart with distinct symbols or markers.

Resource Allocation: Gantt charts can also include information about resource allocation, such as the assignment of team members to specific tasks or the allocation of budgeted resources.

Benefits of Using Gantt Charts:

Gantt charts provide a visual overview of the project schedule, making it easy to understand and communicate the timing of tasks and milestones. By organizing tasks and milestones on a timeline, Gantt charts help project managers identify potential scheduling conflicts or bottlenecks and adjust the schedule accordingly. These graphics also serve as a communication tool for stakeholders, allowing project managers to share project progress, timelines, and dependencies in a clear and accessible format. If consulted during the project, Gantt charts facilitate project planning and coordination by helping project managers allocate resources, track progress, and identify critical path activities.

Creating a Gantt Chart:

Gantt charts can be created using various project management software tools, such as Microsoft Project, Excel, or specialized project management software. Microsoft Project is likely available through your institution, but it can be cumbersome to use and may be more complicated than your project needs. Microsoft does provide several free Excel templates that are intuitive and free if you already use licensed Microsoft products.

No matter what software you use, to create a Gantt chart, you need to list all project tasks, their start and end dates, durations, and dependencies. You then input this information into the Gantt chart software to generate the visual representation of the project schedule. Once created, the Gantt chart can be updated and modified as needed throughout the project lifecycle to reflect changes in task durations, dependencies, or resource allocation.

Your institutions may provide access to Microsoft Project as part of the Microsoft suite of tools. Microsoft Project is a bit complicated and may be more than you need for your project. Here are some websites where you can find free and simple Gantt chart tools:

https://www.Miro.com

https://www.onlinegantt.com

https://www.officetimeline.com/online/gantt-chart-maker

Appendix B: Applying Project Management to Grant Activity

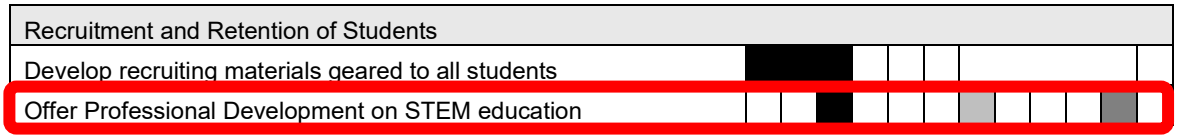
The following is language from an actual ATE funded project.

From the Grant (1204XXX)

Narrative

Provide an Innovative Education Expo for teachers and counselors representing each of the three school system partners within a college's service areas to educate them on STEM opportunities for students. This day will involve presentations, hands on activities for the attendees and a tour of the programs.

Timeline



Hands On Activity

Below are some activities related to the project narrative and timeline above. These illustrate components of planning (some items are missing). As part of this activity, create a timeline of when you would complete the items, who on your team would do them, and how they might overlap.

First Step: Determine what date the event will be held (i.e. June 11, 20XX).

Panel of Professionals working in STEM

1. Determine what areas of expertise you would like represented
2. Invite knowledgeable speakers, facilitators, or experts in relevant fields.
3. Confirm their availability and outline their roles and responsibilities.
4. Provide panel members with necessary information and materials in advance
5. Create handouts, presentations, and other materials that support the workshop
6. Share logistical details such as venue information, schedule, and AV setup well in advance to facilitate smooth presentation delivery
7. Express gratitude for their participation before, during, and after the workshop
8. Send a thank-you note or token of appreciation post-workshop to reinforce the relationship for potential future collaborations

Location

1. Select a location that accommodates the number of participants comfortably
2. Ensure the location has necessary amenities (e.g., audiovisual equipment, internet access, breakout rooms)
3. Verify that the location has the necessary amenities such as restrooms, Wi-Fi, and AV equipment
4. Ensure there is enough space for participants to move around the food stations comfortably
5. Create clear signage to direct participants to registration, food stations, restrooms, and session rooms
6. Set up a desk at the entrance for participant check-in and distribution of materials.
7. Oversee setup and ensure everything is in place
8. Cleanup of the location, including food stations and common areas

Participants

1. Design promotional materials (e.g., flyers, emails, social media posts)
2. Define the target audience (e.g., subject-specific teachers, new educators, experienced teachers)
3. Determine the maximum number of participants based on resources and grant
4. Promote the workshop through appropriate channels (e.g., school newsletters, professional networks, social media)
5. Deadline for registration
6. Set up registration desks, name tags, and any necessary signage
7. Set up a registration system or process to manage participant registrations
8. Communicate logistical details to participants

Food

1. Confirm the number of participants to ensure adequate food and beverages
2. Plan menus for breakfast, lunch, and snacks
3. Identify and contact vendors based on college policy
4. Order food and beverages
5. Confirm any special dietary requests and ensure they are communicated to the vendor.
6. Ensure the venue has adequate space for serving food
7. Arrange tables for breakfast, lunch, and snack stations
8. Determine who will provide utensils, plates, napkins, cups, and serving dishes
9. Set up a dedicated area for beverages with coffee, tea, juice, water, and soft drinks
10. Reconfirm orders with caterer to ensure everything is on track
11. Arrange for cleaning supplies and trash bins to maintain cleanliness during the event
12. Clean up the food stations and ensure the venue is left in good condition
13. Gather feedback from participants on the food and beverage service to improve future events
14. Thank vendors and provide feedback to them for their service