The Mentoring Handbook for Undergraduate Research

at New York City College Of Technology

of The City University of New York

Prepared by The Undergraduate Research Committee

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Section 5. Evaluation and Tools.

This section contains tools for inputs, processes, and outcomes, including individual and process checklists and evaluations, program surveys, and web-based evaluations. The Mentoring Program of Undergraduate Research Web Site link is provided for knowledge dissemination and promotion. In addition, external links to international, local, and national mentoring activities, specifically those focused on faculty member-mentee research, are included.

To begin, mentors need to be crystal clear in how to monitor their responsibility in the mentoring relationship. The following Mentor Responsibility Checklist should be revisited periodically throughout the mentor-mentee relationship.

Checklist 5.1 Mentor Responsibility Checklist

Check off the following expected activities as they are accomplished.

❏ Review results of mentee survey and/or college/university internal needs assessment

❏ Finalize list of mentors' and eligible mentees' current needs and relationships

❏ Distribute mentoring information and obligations via website/seminar/luncheon

❏ Post mentor descriptions on website (limit number of mentees per mentor)

❏ Assemble list of mentors and mentees

❏ Assist in mentor/mentee pairings/teams

❏ Create database of mentor/mentee pairings/teams

❏ Distribute mentoring manual and materials via seminar/luncheon

❏ Organize a timeline

❏ Record periodic meetings with mentors/mentees as needed

❏ Organize and attend mentor/mentee development activities

❏ Organize and develop press activities

❏ Organize and distribute program survey

❏ Assist in overall program evaluation

Also, all mentees should be provided with a checklist outlining their duties within the mentor-mentee relationship, and it should be revisited by both parties throughout the relationship. For both parties, a new checklist should be used periodically. The checklist follows.

Checklist 5.2 Mentee Responsibility Checklist

❒ Make a specific time commitment and keep it

❒ Be receptive to learning new things

❒ Discuss your goals plans and aspirations with your mentor

❒ Reach consensus about goals with your mentor

❒ Construct a plan & let mentor know if anything changes

❒ Seek advice when needed

❒ Address any issues with your mentor as they arise

❒ Be honest about your strengths and weaknesses

❒ Be able to take praise and criticism

What to Include in a Mentoring Contract?

Both short and long-term goals should be listed and assessed throughout the mentor-mentee relationship. The process of setting goals is iterative. An example follows.

Short Term Goals

List your professional goals for the coming year. Be as specific as possible, and indicate how you will assess if the goal was accomplished (expected outcome).

1. Goal: Expected outcome:

2. Goal: Expected outcome:

3. Goal: Expected outcome:

Long Term Goals

List your professional goals for the next 3-5 years. Again, be specific, and indicate how you will assess if the goal was accomplished.

Draft the Mentor-Mentee Contract

For undergraduate research, a template of a formal contract should be in place, so that all participants in the endeavor are on the same page. A contract supplies an air of a seriousness in its bonding agreement. An example of a contract follows.

Draft Contract

This agreement is between the Mentor, _____, and the Mentee, _____, and will last for the approximate time period of _____ and then informally after, _____.

Both Mentor and Mentee agree to meet _____ per _____ and maintain communication between meetings via communication methods deemed appropriate by both parties (See attached communication checklist).

The Mentor agrees:

- To maintain communication and be available to provide assistance and support as needed.

- Assist Mentee in identifying goals and projects that would be beneficial to them.

- Advise Mentee as to services at their school that would benefit them.

- To be honest with the Mentee and give praise as well as constructive criticism.

- Send articles and reading materials that would benefit the Mentee.

The Mentee agrees:

- To maintain communication

- To ask for assistance as the need arises.

- To complete tasks by the established deadlines.

- To read all articles and materials sent by the Mentor.

Everything discussed between the Mentor and the Mentee will be confidential unless otherwise discussed and agreed to by both parties. Both the Mentor and the Mentee agree to follow the guidelines of this agreement for the period specified and to make a good faith effort to resolve any issues that may arise.

_____   _____

_____   _____

Mentor Signature & Date   Mentee Signature & Date

Establishing Codes and Conduct

Students will learn professional habits from the mentor; therefore, the relationship should demonstrate professional behavior. Establish early on which mode works for specific scenarios and devote the attention to communication that it expected to reciprocated. The mentor needs to demonstrate professional communication practices to show mutual abidance by these rules and make use of such professional communication practices as an expectation in all professional endeavors.

Remember: the mentor is the model for a student's appropriate tone for communication. If mentors use a casual tone, it will likely encourage one in response. If a professional tone is expected, use one as it.

Make expectations explicit; do not assume that the mentee can intuit expectations from your habits. As the mentor, establish explicit expectations and parameters for communication. Consider setting boundaries so that you do not send mixed signals about and type of advisement or availability, whether it is in regard to academic, personal, professional or research focus.

Possible modes of communication may be:

- Email via college-based address

- Text messaging

- Digital platform

- Face-to-face meetings

Assessment, Presentation and Publication

Before your mentee presents his or her project, there are many things you should go over with them. The first is to establish what is the "nature" of the presentation. You will need to determine if it will be a formal presentation or a poster presentation. That will establish how and what you should prepare for the presentation and also conveys the communication rules and the formality of the event.

Next, you should establish who the audience will be. Who is attending? How many will be attending? What are their expectations? What is their knowledge level on the topic? This will help you assist your mentee in developing their presentation and who to orient it towards. Determining the speech environment (i.e. classroom, auditorium, hotel conference room), what equipment will be available will also greatly help in preparation for the presentation. Determine if the presenter will need, or even have access to a microphone and if they need a computer or projector. If it's not available, this will allow them to come prepared.

An important part of this section is setting expectations for the presentation. Establish the time limit for the speech, if any visual aids are required and what kind of dress is required.

Inquire as to whether there will be a question and answer session and go over what could potentially be asked in the session. Determine if the presenter should cite sources while speaking and prepare them for the type of presentation and the level of formality of the occasion. For example, the following criteria for effective communication can be made as a list and provided to the mentee:

Criteria for Effective Communication

- You should make eye contact for 70-80% of the speech

- Be extemporaneous in your delivery

- Use a conversational style

- Brief use of notes or note cards

- Carefully prepared and rehearsed

- Adapt to audience feedback

Visual Aids as Effective Communication Tools

Any visual aid is evaluated on 3 levels: does it add clarity, interest, or retention? It is the duty of the mentor to establish how well the visual aids are constructed and how well the information is delivered. Make sure mentees understand the requirements when citing supporting material. This must include the date of publication, name of the publication and author or supporting organization.

Managing Anxiety

As the mentor, it is important to make the mentee realize that nervousness is normal, and indeed, expected. Remind mentees that their goal is to communicate information; it is *not* a theatrical performance. Explain that practice and preparation are the best ways to manage anxiety before their speech. Providing a handout to mentees of anxiety management tips may help following discussion.

Tips to manage anxiety during a speech are to:

- Concentrate on your message

- Slow your rate of speech

- Realize that most of the nervousness that you feel is not visible to the audience.

Poster Presentations

Preparing your mentee for poster presentations differs from preparing for panel presentations because they are more informal. They have different communication rules (i.e., you'll have conversation with people that involve the same "turn taking" as everyday

conversations.) There is a less structured pattern of organization (because the conversation will determine what is discussed and what is not). Help them to understand that despite the fact that this is a less formal presentation, there are still rules and guidelines to be followed.

Anticipating Talking Points

You can begin by asking your mentee to prepare a 1 minute explanation for:

• Research background (Tell us about your research topic and why it is important to understand)

• What data did you collect and HOW did you collect the data?

• What was your method of data analysis?

• What were your findings?

• What conclusion(s) can you draw from the findings?

• What are the next steps for the research? For example, does it lead to a new research question and project? If so, be able to describe that briefly.

Frequently Asked Questions about Poster Presentations

Mentees expected to present their research endeavors will need advisement as to how one goes about presenting. The following talking points may be addressed:

• You should consider wearing business casual dress (unless instructed otherwise) for the poster session.

• If you're citing information during your discussion, make sure to include the source and the date.

• You can leave your poster to see other posters; but don't leave anything valuable.

• You might bring something to drink so you can keep your mouth from becoming dry.

Panel Presentations

Preparing your mentee for panel presentations differ from poster presentations because they are more formal and have different communication rules (no verbal interruption from audience). They should be prepared for more structure or organization from these presentations. Because these speeches are typically considered more formal, inform them that they should consider wearing business attire (unless instructed otherwise).

Speech Organization

Good organization involves:

• Clear Central Idea

- Signposts (words such as: First, second, next, then, last)

- Connectives (i.e., Transition = Internal Summary + Internal Preview)

- Elements of an effective introduction and conclusion

Rehearsing the Presentation

Try to prepare your mentee for their presentation with helpful tips. Recommend that they read through the speech several times, talking through any examples or stories. Tell them to concentrate on gaining control of ideas instead of memorizing the speech word-for-word. Suggest they practice using visual aids while rehearsing as well as practicing their entire speech several times from start to finish while timing themselves. Each time they rehearse, the speech time should be approximately the same. If the speech consistently exceeds the time limit, they should condense the information and eliminate clutter. Inform them that they can polish the speech by practicing both verbal and nonverbal delivery tactics and the best way to prepare is to practice speech in front of friends or family who will give you honest feedback on eye contact and distracting mannerisms.

Choosing a Student Mentee as a Co-author

A part of the mentoring process is helping to assist your mentee in choosing another student as a co-author on their project. There are many steps in this process. Checklist 5.1 may help with this process.

Checklist 5.1 Choosing a Student Mentee as a Co-author

- Ensuring a good fit

  - How do you know a student is genuinely interested in the topic?

  - Is the student willing to put in enough time on his/her own?

  - Does it seem like you will work well together?

- Does the student have sufficient knowledge of basic material?

  - How do you know if the student can apply prior knowledge effectively before working with him/her?

  - How do you evaluate the student's technical skills?

- Bridging the gap between basic knowledge and high-level applications

  - Could gradually increment difficulty level

  - Using analogies involving basic knowledge helps

- Split time between technical calculations and general overview of background material

  - How to strike a balance between the two extremes?

- Preparing student for uncertainties

  - Will the calculations work?

  - Will the results be interesting enough to publish?

  - Will the paper be accepted for publication?

- What to do with a student when things do not work

  - A record of this could provide valuable information for the future

  - Assuring student that he/she has made a contribution

What Writing a Paper with a Student Mentee Entails

Publishing a paper with a student mentee is not a simple undertaking. Many factors must be considered. The following points may help with the reflection process regarding this undertaking:

- Writing a paper can involve calculations, explaining background material and results and citing literature

  - What are reasonable goals for involving students?

- Deciding whether to include or exclude the student as a co-author

- Learning by example

- Knowing what plagiarism is and how to avoid it

  o Distinguishing previous and new results and giving citations

- Addressing referee's criticisms

- Preparing student to give presentation

  o What not to do when giving a presentation

  o Instructing student how to explain topic clearly

  o Handling stage fright

Future Goals of Student Mentees

How do mentors help with the future goals of student mentees once the relationship is coming to a conclusion? Not all mentor-mentee relationships lead to the mentee wanting to follow in the footsteps of the mentor. Possibilities follow:

- The mentee may not pursue the subject of research project

  o Probably will still be a valuable experience

  o General skills learned

  o Published paper listed in resume

- The mentee many want a letter of recommendation

  o Have letter show an appreciation of direct and indirect student contributions

  o Place the research topic in context

Closing the Relationship

All relationships between mentors and mentees go through changes, and indeed, some end when the specific goals and outcomes are realized. While mentoring relationships ideally endure and stand the test of time, most evolve. Just as when you begin the relationship, as the relationship comes to closure, engage in reflection.

Reflection: For my mentee to experience closure (every week, and at the end), I must:

• Notify him or her about the duration of our meeting.

• Discuss achievements and give positive feedback.

• Update our mutual calendars.

• Be prepared to fill the meeting time with activities.

• Take every moment seriously.

• Revisit our mutual purpose.

• Ask if the relationship is reaching a learning conclusion.

• Identify barriers to reaching outlined goals and objectives.

• Plan for mutual accountability.

• Establish a process for acknowledging the time for closure.

• Establish ground rules for the concluding conversations.

• Plan for consistent personal evaluation of the process, from the point of the mentor and the mentee.

• Decide what if anything you would do differently as a mentor the next time around.

Then, think about doing the following in terms of ideas for celebrating your successes:

• Trade reflective letters as written expressions of your mentoring relationship. Make the letter a permanent record of encouragement and support as well as a memento. The letter may focus on what you learned from each other, something that has special meaning, a message of good luck, and motivational messages for the future.

• Redefine your future relationship. Perhaps you want to keep in touch to assist your mentee in their professional progression. Graduate school plans may be a real possibility, and the mentee may indeed appreciate and benefit from further guidance.

• Develop a plan for future communication. Continue communication as seen fit for the unexpected times the mentee reenters the life of the mentor.

Conclusion

Throughout this handbook tools were created to benefit both the mentor and mentee develop the necessary skill set to start off on the right foot and continue the relationship through the inevitable bumps along the road. It is hoped that the use of this handbook, will make establishing and defining the relationship easier for both the mentor and the mentee.

When problems arise this handbook may serve as a guide that will enable you to put the problem in perspective and the relationship back on track. Following this guide will help give you and your mentee the best opportunity to learn and succeed in your partnership.

The act of mentoring is not easy but is definitely rewarding. The mentor/mentee relationship requires a significant amount of time and energy. As a mentor you will fulfill many roles for your mentee. You will do well to keep in mind that the main goal for the mentor is to help the mentee define her or his goals and help the mentee acquire the skills to achieve those goals. While it is obvious that the main benefit is to the mentee, receiving advice and wisdom from someone much further along in their career, both parties can benefit from a healthy working relationship. Mentoring is a two way street and is not guaranteed to be successful. However, with preparation and planning it should be a growth experience for both parties. Effective communication skills and cultural sensitivity on the mentor's part is key. Our college consists of an ethnically and culturally diverse student body many of whom are English as second language speakers. Conscious effort to respect diverse culture and backgrounds exercised by both the mentor and mentee will help make this a meaningful experience for all. Mentoring can provide the opportunity to learn from different perspectives, a chance to grow within your field and shape the future of your profession. The experience and the wisdom provided by the mentor will be an invaluable help to the mentee and the mentor will also learn from the experiences as viewed by the mentee.

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Institution: **New York College of Technology (NYCCT)**	Project Duration (Years): Start and Ending Dates	Funding Agency	Program Goals	Number of Participants	Target Audience
Title Program 1: Metropolitan Mentors Network: Growing a STEM Talent Pool in New York City	4 Years 01/01/2007 - 12/31/11	National Science Foundation	Provides career development and research opportunities for students in STEM disciplines from a pre-freshman summer seminar through graduation, employing a cyclical mentoring system that enables mentees to become mentors and supports students through graduation and into employment or further study.		Freshman/sophomores
Title Program 2: Ground-Based and Satellite Remote Sensing at NOAA-CREST	4 Years 08/01/2011 - 07/31/2015	National Science Foundation	Supports selected students in an intensive research experience under the supervision of a NOAA-CREST scientist in ground-based and satellite remote sensing. Encourages continuation to master's and doctoral study.	75	Freshmen/sophomores Physics
Title Program 3: Achieving Proficiency in Engineering Research through NASA-Related Initiatives	3 Years 09/01/2010- 08/31/2013	NASA	Supports a partnership between City Tech and Hostos Community College to provide under-represented minority students with the opportunity to strengthen their research and communication skills, to transfer to baccalaureate programs, and to participate in internships at NASA labs.	30	Freshmen/Sophomores Mechanical Engineering Technology Industrial Design

Title Program 4: S-STEM Program	4 Years 06/01/2009- 05/31/2013	National Science Foundation	Scholarship support for students	100	Freshmen/Sophomores Chemical Technology and Computer Science Juniors/Seniors Applied mathematics
Title Program 5: Creating and Sustaining Diversity in the Geo-Sciences Among Students and Teachers in the Urban and Coastal Environment of New York City	2 Years 09/01/2011- 08/31/2013	National Science Foundation	The proposed activities combine geoscience research experiences with focused, multidimensional/layered mentoring, and a robust learning community that produce holistic and engaging stimuli for the scientific and academic growth and development of our K – 12 student and teacher participants.		
Title Program 6: LS-AMP		National Science Foundation			

Title Program 7: Learning Product Design through Hands-on Mechatronic Projects	3 Years 08/15/2010-07/31/2013	National Science Foundation	Our goal is to change the paradigm for technician education in mechanical engineering, electro-mechanical, and industrial design programs by making concurrent design and mechatronics the hallmark of these programs at City Tech.	50	Juniors/Seniors Mechanical Engineering Technology Electro-Mechanical Engineering Industrial design
Title Program 8: Automated Computation	3 Years 10/01/2011 - 09/30/2014	National Science Foundation	This project will provide our undergraduate students with a non-technical but logically coherent view of the current status of particle physics research.	3	Freshmen/Sophomores Physics
Title Program 9: Constrining Gravity Dual Models	2 Years 10/01/2010-09/30/2012	National Science Foundation	PI will broaden the participation of underrepresented groups by involving students in research projects. This will enable the students to apply technical skills learned in the classroom, develop their investigative skills and participate in the scientific enterprise. roaden the participation of underrepresented groups by involving students in research projects. This will	3	Freshmen/Sophomores Physics