

## **Identifying Non-Cognitive Qualities In Graduate Applications**

### **Module Description and Intentions**

This module is intended for a group of 3-5 faculty to complete all activities in approximately 60-minutes. Faculty will reflect on their current admissions practices through the discussion of relevant research and the collective application of a rubric targeted on non-cognitive qualities.

We provide an overview of non-cognitive qualities. However, we intend for faculty to use this module to take a deep dive into two examples (resilience and self-motivation) to serve as a foundation that they can continue to build upon with the inclusion of other suggested non-cognitive qualities in the future.

Finally, as part of the activities in this module, we provide sample pieces of a graduate application (transcript, letter of recommendation, etc.). However, based on our in person facilitations of this module, we strongly recommend pre-selecting 1-2 graduate applications from previous admissions cycles in your program.

## Identifying Non-Cognitive Qualities In Graduate Applications

Read the information in the document and work through the activities either individually or with a group of 3-5 people.

### Learning Objectives

By the end of this module your group will:

- Engage in discussion regarding what non-cognitive qualities should be evaluated in applications of incoming graduate students.
- Evaluate several elements of a graduate application (including personal statements, a letter of recommendation, and an interview) for non-cognitive qualities that you are looking for in potential graduate students.
- Discuss the evaluation of non-cognitive variables with colleges to ensure consistency

## Overview of the Holistic Review Process

### Develop Evaluation Criteria

- Build Rubric
- Academic Preparation
- Research Potential
- Fit with Program
- Non-Cognitive Variables

### Systematic Review

- Evaluate Application Using Rubric
  - Read Personal Statements
  - Read Letters of Recommendation
- Evaluate Transcripts

### Application Decisions

- Discuss Evaluations
- Make Informed Decisions

### Activity: Emotional Competency Inventory

Below are six examples of non-cognitive qualities.

- 1) Self-Awareness - Recognizing one's emotions and their effects (Boyatzis, 2011, p. 94)
- 2) Achievement Orientation - Striving to improve or meeting a standard of excellence (Boyatzis, 2011, p. 94)
- 3) Adaptability –Flexibility in handling change (Boyatzis, 2011, p. 94)
- 4) Self-Control –Keeping disruptive emotions and impulses in check (Boyatzis, 2011, p. 94)
- 5) Teamwork - Working with others toward shared goals. Creating group synergy in pursuing collective goals (Boyatzis, 2011, p. 94)
- 6) Perseverance –Persistence [perseverance, industriousness]: Finishing what one starts; persisting in a course of action in spite of obstacles; “getting it out the door”; taking pleasure in

completing tasks (Peterson & Seligman, 2004, p. 29; items adapted from Duckworth, A.L., Peterson, C., Matthews, M.D., & Kelly, D.R. (2007).

1. What qualities do you think are important for students' success in graduate school? Are there any others not on this list that you think are critical for success?



Discuss Question 1 as a group.

This module is designed to help you design a rubric that evaluates a single non-cognitive quality that your program values in prospective graduate students.

There are many non-cognitive qualities beyond the six examples we provided. We have opted to take the approach of having you get firsthand experience in looking for evidence of two non-cognitive qualities in graduate applications in order to help faculty get comfortable with nuance and subjectivity of evaluating narrative data.

## Section 1: Overview of Non-Cognitive Qualities

Achievement tests were developed as a way to measure general knowledge, specifically in an attempt to measure cognitive abilities, such as mathematical knowledge and reading comprehension. These assessments were anticipated to predict success across labor, education, as well as general life skills.

Non-cognitive skills are those skills not assessed by an IQ or achievement test, which tests cognitive skills. These skills are broadly emotional and social competencies, essentially the factors that account for effectiveness outside of cognitive performance. Non-cognitive factors may be inherent within an individual, but also can all be developed and assessed on with behavior measures. Researchers have found the evidence that non-cognitive factors account for as much or more impact upon success as cognitive factors. For example, the Emotional-Social Competency Inventory (ESCI) is one such well established framework for looking at non-cognitive competencies<sup>1</sup>.

Cognitive Variables	Non-Cognitive Variables
General Intelligence	Self-Motivation
	Resilience
Verbal Reasoning	Grit
	Adaptability
	Self-Awareness
Numerical Reasoning	Professionalism
	Self-Control

<sup>1</sup> ESCI: ([http://www.eiconsortium.org/measures/eci\\_360.html](http://www.eiconsortium.org/measures/eci_360.html))

While there are many non-cognitive factors that may be important to your program, this module will specifically focus on the development and application of two: self-motivation and resilience. These two non-cognitive qualities were cited by faculty as being the two most important factors they look for in a potential applicant.

The research on non-cognitive qualities has been in ongoing development in both psychology and business management research. As the research continues to develop, the process of assessing these qualities and the weight that those assessments carry, may change.

## Section 2: Evaluating Text

Similar to the process that you followed in the Rubric module, the process of evaluating narrative text has four steps:

1. Making a rubric
2. Evaluating text
3. Assigning a quality level
4. Discussing any discrepancies

The differences lie in the context of what you are evaluating. In the rubric module, you evaluated a personal statement and letter of recommendation for evidence of research experience. Evaluating text for non-cognitive qualities requires more nuance and interpretation since it is unlikely that an applicant will directly articulate “I am resilient for these reasons.”

### Worked Example: Mark Text (Step 2)

2. For this activity, use your computer/tablet to view the following segment of a letter of recommendation.

Category	Definition
<b>Resilience</b>	The ability to recover quickly from difficulties; factors that make someone resilient: a positive attitude, pursues goals despite obstacles and setbacks, and the ability to see failure as a form of helpful feedback
<b>Self-Motivation</b>	The force that drives you to act; what pushes us to achieve our goals; personal drive to achieve; takes initiative; acts on opportunities

After reconstructing a probe that was malfunctioning, James determined that the present measurement dewar was insufficient for our measurements due to heating effects. He subsequently found a spare belly dewar and constructed a lid with a fixture that mated with the a probe so that the sample would be immersed in liquid helium.

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*Resilience:*

Looking at this example, we see that James was not deterred by setbacks that the insufficient dewar caused. Rather, he found a workaround in order to move forward with his measurements. For this reason, this entire section can be coded as an example of James demonstrating resilience.

*Self-Motivation:*

In this example, we see that James took the initiative to create a lid for the dewar that would serve his measurement needs. The segment of the text that talks about James creating a new lid for the dewar can be coded as an example of self-motivation.

Depending on how your program handles electronic application, you have a variety of options for marking textual evidence of non-cognitive variables. We recommend keeping all markings and notes in the files themselves rather than taking separate notes in order to make the process of scoring the level of evidence more transparent.

**Why do we need to use be systematic in evaluating text?** Systematic organization of text into specified categories, increases transparency of how decisions were made. In addition, it compiles all information into consistent forms for discussion with colleges. In contrast, ad hock processes run the risk of extrapolating and guessing based on preconceived ideas and biases.

**A few notes on marking text:**

- The same piece of text can be representative of multiple categories
- A piece of text may not may not fit into any category
- A category in your table could go unused

**Activity: Mark Text (Step 2)**

Individually use your computer/tablet to view the following segment of a letter of recommendation. Mark the text, just as you would if you were evaluating a graduate application, noting occurrences of evidence for resilience and self-motivation.

<b>Category</b>	<b>Definition</b>
<i>Resilience</i>	The ability to recover quickly from difficulties; factors that make someone resilient: a positive attitude, optimism, the ability to regulate emotions, and the ability to see failure as a form of helpful feedback
<i>Self-Motivation</i>	The force that drives you to act; what pushes us to achieve our goals; personal drive to achieve; takes initiative

**Except from Letter of Recommendation:**

As an undergraduate researcher at South and Western University, Andrea carried out numerous experiments exploring the variables that influenced packing quality, and also helped us implement a reference frame transformation protocol so that we could relocate the same region pre and post treatment under the microscope (within the limit of resolution of the microscope

stage). This work was critical in enabling us to work with the imperfect masks that we had, and in helping us to move forward.

Andrea is a person who has confidence in herself and is motivated by significant problems. She also had a substantial cultural transition to make in coming from Venezuela. She has made that transition successfully.

In her time at South and Western University, Andrea spoke openly about her long term interest in starting her own company. She was always encouraging her peers, unafraid of asking questions when they need to be asked, and had habits (neatness, thoughtfulness etc.) that were supportive of the other projects in the same lab. Andrea is a big picture person who is committed to seeing projects through to a successful conclusion.

### Section 3: Assigning Scores (Step 3)

After reading and marking each individual document, then you can assign a score for each non-cognitive variable in that document. We recommend scoring **immediately** after marking text in a document to remain consistent between the assigned score and text evidence.

Using a rubric, you as a rater can decide what “score” to give a potential applicant for each of the non-cognitive qualities you are interested in. It is critical to be transparent about why you are assigning each score.

Good Example		Bad Example	
Score	Self-Motivation	Score	
0	No evidence	0	
1	Demonstrates some desire to achieve their goals <b>OR</b> has some history of taking initiative	1	<input checked="" type="checkbox"/>
2	Demonstrates a desire to achieve their goals <b>AND</b> shows a history of taking initiative	2	
3	Demonstrates a <b>strong</b> desire to achieve their goals <b>AND</b> demonstrates a <b>strong</b> history of taking initiative	3	
<i>Notes:</i>		<p>This is a <b>poor example</b> of scoring because there is no explanation for why a score of “1” was given or what a score of “1” means.</p>	
<p>This is a <b>good example</b> because allows others to see what score the rater assigned, what that score means, and a very brief justification of that score. These types of scoring systems increase transparency and the efficiency of discussion.</p>			

**Section 4: Handling Discrepancies (Step 4)**

Discussion of how text was categorized is an integral part of this process of evaluating text because it is critical that all reviews are on the same page. Discussions of how text was marked serves as a way to “mitigate interpretative bias” and ensure a “continuous dialogue between researchers to maintain consistency”<sup>2</sup>.

Two possible discrepancies may come up within your discussions:

**Discrepancy is how a piece of text is categorized:** If “unafraid of asking questions when they need to be asked” was coded as *resilience* by Rater 1 and *self-motivation* by Rater 2, is it possible that the text could

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<sup>2</sup> (Miles, Huberman, & Saldaña, 2013)

be double-coded as both *resilience* and *self-motivation*? Could Rater 1 have accidentally miscoded the text at *resilience*? These discussions should take place between the two raters who disagree.

**Discrepancy in the definition of a category:** Prior to beginning the qualitative analysis, all raters should agree on the definitions of the categories used. However, while reading a new document you may discover a new way that *self-motivation* is portrayed that was not fully captured in the original definition. In these cases, the entire team of raters should agree on a modified definition.

There will never be perfect agreement between all raters, but discussion of any discrepancies increases transparency and reliability of the analysis.

#### Activity: Discussing Marked Text (Step 4)

3. Discuss how you marked the excerpt of the letter of recommendation as a group, if you have not already.

### Section 5: Practice Evaluating Graduate Application

#### Activity: Making a Rubric For A Non-Cognitive Variable (Step 1)

4. One assessment of non-cognitive qualities is the Emotional-Social Competency Inventory. Below is a list of some of the non-cognitive qualities the ESCI can assess. Select one non-cognitive variable your program is interested in from the list below.

Non-Cognitive Quality	Definition
Trustworthiness	Maintaining integrity.
Achievement Orientation	Striving to improve or meet a standard of excellence.
Adaptability	Flexibility in handling change.
Self-Confidence	A strong sense of one's self-worth and capabilities.
Teamwork and Collaboration	Working with others toward shared goals and creating group synergy in pursuing collective goals.
Communication	Listening openly and sending convincing messages.
Organizational Awareness	Reading a group's emotional currents and power relationships.

As a group, articulate your descriptions for each of the scoring levels in for that non-cognitive quality. Think about what it means for an applicant to be high, medium, or low on that construct. The more concrete your definitions, the more consistent you can expect your judgments to be. Remember, the levels should be divided such that there will be an even distribution of high's, medium's and low's as possible.



Score – Personal Statement	Score – Letter of Recommendation	Non-Cognitive Variable: _____
0	0	No evidence
Low	Low	
Medium	Medium	
High	High	
<i>Notes:</i>		

#### Activity: Using a Rubric: Sample Personal Statement

5. Using the rubric above for your chosen construct, *individually* evaluate either:

- the sample personal statement from a student’s application found in Appendix A.
- 1-3 personal statements from your past applicants



Once you have completed the activity, *as a group* discuss how each of you scored the personal statement(s).

6. Using the sample rubric below for Research Potential and Experience, *individually* evaluate either:

- the sample letter of recommendation from a student’s application found in Appendix B.
- 1-3 letters of recommendation from your past applicants

#### Moving Forward

At the completion of this module, you have:

- Engaged in discussion regarding what non-cognitive qualities should be evaluated in applications of incoming graduate students.

- Evaluated several elements of a graduate application (including personal statements, a letter of recommendation, and an interview) for non-cognitive qualities that you are looking for in potential graduate students.
- Discussed the evaluation of non-cognitive variables with colleges to ensure consistency

Now, we invite you to take these tools and skills further by continuing the development of your rubric by operationalizing quality levels for other non-cognitive qualities. Then, to test the efficacy of your rubric before using it in an admissions cycle, we suggest admissions committee members practice evaluating on small selection of applications from previous years. A practice cycle will allow faculty to get acquainted with the practice of using more rigorous evaluation to evaluate subjective (and often imperfect) applications in an effort to avoid relying purely on “gut feelings.”

## References

Miles, M. B., Huberman, A. M., & Saldaña, J. (2013). *Qualitative data analysis: An expanded sourcebook* (3rd ed.). Thousand Oaks, CA: Sage Publications Inc.

Quinn, Joann (2019). Coding Course.

## Appendix A

### Personal Statement – Andrea Fernandez

Attn: Office of Graduate Admission

I am writing this letter to express my interest in pursuing the Master of Science program in Material Science at West New York University. My desire to enroll in the program is directly related to my undergraduate studies and professional experience. Achieving higher education is essential for my future professional and personal goals. I hope that the following examples of experiences and milestones serve as evidence regarding my preparation coming into the program and my desire to pursue this degree of education. Moreover, I hope these examples reflect my strong motivation and honest desire to advance myself as a successful scientist.

I moved to the United States from Venezuela at the age of 18 to attend Northeast University. I graduated with a Bachelor's of Arts in Chemistry. As an undergraduate student of chemistry, I most valued my experience as a research assistant to Professor Brown, a role model and an outstanding scientist in the field of chemistry. Part of my responsibilities as a research assistant involved experimenting, documenting and verifying various techniques implemented to achieve a well-packed hexagonal array of polystyrene (PS) nanospheres. Subsequently, the PS substrate would be gold coated and used to enhance raman spectroscopy (RS) sensors. We attempted different drying techniques and centrifugation parameters to compact the PS matrix amongst others. Although the methods we implemented did not yield a significantly larger continuous matrix, the experience was invaluable. It allowed me to get a glimpse on how to properly carry out a research project while giving me the opportunity to present data and illustrate results in a timely manner.

Upon graduation, the options for international students in the United States for employment are limited due to immigration restrictions. Entering the labor market in the United States as an international student was amongst the hardest task I have encountered. I recall the stress and anxiety that accompanied me during the process of finding a job. I began working at ATRONA Test labs in 2008, approximately two months after graduation. ATRONA is a young-privately owned material science lab that was established in 1999. I was hired at an entry-level position where my responsibilities ranged from making the morning coffee to sample preparation. At the time, ATRONA had a total of 8 employees, including metallurgists, mechanical engineers, fastener experts and other technicians like myself. I unfolded naturally in that environment and proactively learned everything my mind could absorb about metallurgy and polymers. After six years, several title changes and upon the retirement of my predecessor, I now manage the laboratory, including the metallurgical, polymer and some of the mechanical division. ATRONA now consists of more than 20 employees. A few of my current responsibilities include the supervision and leadership of a team of failure analysts. In addition, I manage the project flow logistics within the company. I am accountable for some aspects of the quality program, the development and growth of the polymer division, the client relationship and the growth and expansion of the lab.

Many times, I find myself working into nightfall researching and reading countless of books and articles in search for possible answers that could help me explain a variety of complex scientific issues. Some questions I have had are the following: Why isn't the polysulfone collar and stem bonding adequately after premature exposure to methylene chloride? Why is the Noryl substrate exhibiting evidence of fatigue cracking around the copper inserts? Why is there evidence of polyacrylamide in the FTIR spectrum of a supposedly homopolymer polypropylene case? Does the FTIR spectrum of the 10 K angstroms thick parylene coating on a nickel foil substrate differ after exposure to fluorine gas and if so, why? Why is there evidence of a sigma phase constituent in the duplex stainless steel microstructure? Why are the hard gold plated contacts failing in the micro switch? These are just a few of the many questions I have encountered working in this lab. I genuinely enjoy the investigative and forensic nature of my job. The gratification of knowing that I have directly assisted a client with a problem is one of my main drivers to continue this academic path. Conversely, I have had situations where I have not been able to answer the questions. I directly link this to my limited academic exposure and education in the field of polymer and material

science. The immediate feeling of powerlessness and inability to solve the problem is an equal driving force that motivates me to pursue a higher degree. I understand the importance of education and the value added it can have on someone. Therefore, as I grow in my career, I feel the responsibility and the need to share the knowledge I have and want to acquire with the staff who I currently work with and will work with in the future. A means to achieve this knowledge sharing is by formally entering a graduate program to become a technically strong professional. I strongly believe graduate school will naturally converge my undergraduate chemistry background with six years of laboratory and material science "hands on" experience.

The decision to pursue higher education has not been an easy one for me. Coincidentally, upon the announcement of my future plans, my employer offered to sponsor a Green Card (US Resident). I decided to deny my employer's offer and seek admissions in a graduate program. I am, momentarily, forfeiting my chance to become a US Resident because I understand that to continue advancing in my career it is important to get academic and technical training to become a strong material/polymer scientist.

Pursuing a Master of Science degree in material and polymer science is essential to accomplish my future career and academic goals. I hope to build on my past experiences and establish a sound career as a consultant. I may do so by opening my own lab services in Bolivia or the United States, and/or returning to ATRONA and continue helping the business move forward. The future is always in motion, despite what path I decide to pursue; it is without a doubt that it would be best accomplished and I will be better prepared after I have successfully completed this program.

I am very interested in participating in the material science program offered at West New York University for several different reasons. First, after reviewing the website of the Department of Materials Science, I recognize several instruments I am familiar with. I've had the chance to work with TA's DSC, TGA and TMA (the Q series and the 2000 Series). Moreover, I currently operate a Bio-Rad 3500 Excalibur with a PIKE Gladiator ATR and a UMA 500 stereomicroscope. Also, at ATRONA, I operate a Hitachi 3500 SEM with a silicon drift detector in our EDS system. My experience with these instruments (amongst others) may help transition the introduction of a new student and research member and allow the research group to focus on other more crucial aspects of the investigation other than training. Furthermore, I would like to work with Professor Johnson and Professor Smith. Their focus in polymers would serve well with my lab experience and chemistry background.

**Appendix B**  
**Letter of Recommendation – Andrea Fernandez**

Dear members of the graduate admissions committee,

I am writing to recommend Miss Andrea Fernandez as a superb candidate for graduate studies in material science. I first came to know Andrea as a student in my analytical chemistry and instrumental analysis courses as well as in two independent studies some years ago when Andrea was an undergraduate student at Northeast University. She was a wonderful student researcher in those years, and since then has had an impressive track record in helping a small metallurgical and polymer analysis company grow and thrive.

As an undergraduate researcher, Andrea implemented the use of colloidal self-assembly to form two-dimensional colloidal crystal arrays in our lab for subsequent over coating with silver or gold to form nano-prisms on glass substrates. Our early masks were not as crystalline as we had hoped, however they did contain small high quality crystalline domains. Andrea carried out numerous experiments exploring the variables that influenced packing quality, and she also helped us implement a reference frame transformation protocol so that we could relocate the same region pre and post treatment under the microscope (within the limit of resolution of the microscope stage). This work was critical in enabling us to work with the imperfect masks that we had, and in helping us to move forward.

Andrea was a strong student in the classroom, but I always felt that her grades underestimated her intelligence and potential. She is a person who has confidence in herself and is motivated by significant problems. She also had a substantial cultural transition to make in coming from Venezuela. She has made that transition successfully.

At Northeast U, Andrea spoke openly about her long term interest in starting her own company. She was always encouraging her peers, unafraid of asking questions when they need to be asked, and had habits (neatness, thoughtfulness etc.) that were supportive of the other projects in the same lab. Andrea Fernandez is a big picture person who is committed to seeing projects through to a successful conclusion. I deeply appreciated her thoughtful recommendations regarding how we might modify our strategies to be more efficient or successful.

Andrea Fernandez is one of the most fundamentally curious, and experimentally sharpest students I have ever had. Her notebook was immaculate. She is fun to work with, and has a very even keel. She is applying to graduate schools for the right reasons: to strengthen her fundamental knowledge of material science so that she can strengthen her research and materials problem solving skills. I am delighted to recommend Andrea Fernandez to you as a superb candidate for graduate studies at the West New York University, and would be delighted to be contacted if can be of further assistance.

Sincerely,  
Prof. Brown