Am I a STEM Professional?
Self-Authorship and Student Professional Identity Development

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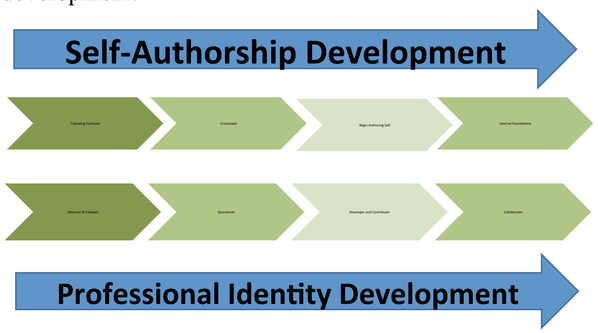
Abstract

Development of professional identity is a ***critical juncture***. To explore STEM student professional identity development we assessed STEM students using a lens of ***self-authorship.*** Our results indicate that several proxy questions may be useful for assessing STEM student professional identity development and their engagement in learning partnership activities.

Theoretical Framework

Self-authorship (Baxter-Magolda, 1998) framework is well aligned with stages professional identity development.



A model of professional identity development (bottom) aligned with self-authorship (top)

Post-secondary education substantially contributes to student cognitive growth, professional identity development, and career success (NRC, 1999, 2002).

The investigation of student identity development is extensive (Pascarella & Terenzini, 1991). Most explorations of identity development have focused on gender (e.g. Jones, 1997), place in society (e.g. Waterman, 1982), confidence (e.g. Laird, 2005), and professional engagement (Sweitzer, 2009).

Research to explore student professional identity development (Sweitzer, 2009) and to assess self-authorship on a large scale (Creamer, Magolda, & Yue, 2010; Pizzolato, 2007), together has not take place.

Learning experiences that require students to explore and struggle with ideas and argue positions, critically think and scientifically reason, are likely to foster professional identity development (Baxter Magolda 1996; Torres & Hernandez, 2007) which his critical for STEM students.

Methods

Research Questions:

- *How can we assess undergraduate STEM students levels of professional identity?*
- *How effective are items focused on learning and academic interactions for assessing level of professional identity?*
- *What are the levels of professional identity development of undergraduate STEM students?*

Participants

- 194 completed surveys
- Average age of 25.31 years ($S = 7.86$)
- 34% female and 66% male
- 14.3% freshman, 21.4% sophomores, 32.3% juniors, and 30.5% seniors and 1.5% graduate students
- Average of 3.23 years of college ($S = 1.6$)
- 64% engineering majors,17% biology, 6% math, and 13% physical and geological sciences
- 30% had engaged in service learning, 24% in an internship, and 55% in paid work experiences
- 37% were involved in clubs related to their major or minor, 25% had engaged in related research

Instrument

We developed a 27-item survey to capture levels of students' professional identity development, which included items to assess:

- Preferences for learning
- Engagement in extracurricular activities
- Justification for pursuing a STEM career
- Description of professional interaction – e.g. communication with faculty members.

References

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This work is affiliated with STEM Central STATION funded by an NSF Innovation through Institutional Integration Award #DUE-0963659. Any opinions, findings and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the national Science Foundation.

Results

- ***Misalignment*** between ***perceptions*** of level of professional development and ***professional behaviors*** indicating students may over estimate their levels of professional identity
- Students ***perceptions of themselves as STEM professionals*** was correlated with their ***comfort with talking with faculty*** ($r = .24$, $p<.01$), ***years of college education*** ($r = .15$, $p < .05$).
- ***Student perceptions of themselves as STEM professionals*** correlated (r = .16, p <.05). with ***why they are STEM major*** (coded using SA framework)
- Marginally non-significant correlation with description of how they interact with STEM faculty
- Level of professional identity associated with preference for learning ($F = 1.93$, $p <.05$) shifting to more interactive forms of learning such as classroom discussion.

SA Stages	Professional ID Level	Codings	Example of how students interact with faculty members
Following Formulas	Observer & Follower Frequency = 73 (45.9%)	Authority, Distanced, No Contact, Very Limited Contact	"Respectfully" "e-mail questions" "…discussions in class is the usually extent." "I don't interact all that much, honestly sometimes faculty scare me. The few times I have talked to professors they seemed as though they didn't have the time."
Crossroads	Questioner Freq. = 61 (38.4%)	Using Established Means, During Regular Meetings, Respect	"I ask questions at the end of class, and if I need further information I will visit them in their office." "Directly - usually during office hours, class time, lab, or before and after class."
Becoming Author of Self	Developer & Contributor Freq. = 22 (13.8%)	Seeking Communication, Building Relationships	"I have a close relationship with most of my professors. I sit in the front row, ask them questions, visit office hours frequently, etc." "…make it a point to stop by so they know who I am." "I view the faculty as highly respectable peers."
Internal Foundations	Collaborator Freq. = 3 (1.9%)	Interact as a Peer, Contribute Equally	"In a one on one person to person manor. I just talk to them like I would anyone else." "I like to stop by and talk with faculty in or outside of class. I like to build friendships with faculty."

Discussion

- Students perceive they are have more advanced professional development than their professional behaviors indicate.
- Our research indicates way in which students interact with STEM faculty and engagement in professional activities (e.g. research) are associated with level of professional identity.
- This finding suggests that students who have more advancedprofessional identity are likely to be more comfortable with engaging in STEM learning conditions that involve situations of ambiguity and contribution to learning.
- With experience student reasons for being a STEM major shifted from more external references (financial reward) to more internal references (making a difference, enjoyment), suggesting that as professional identity become more developed, students internalize the reasons for being a STEM professional, as predicted by self-authorship.

Ongoing Research

- Developing a method for rapidly assessing the ***Learning Partnership Model***
- Examining level of ***professional identity development*** and engagement in an ***REU***
- Examining ***professional identity development*** and role as a ***Learning Assistant***
- Examining ***course structure***, ***preferences*** for a course, ***goal orientation***, and ***success*** with learning