Role of Peer Networks in Student Choice of Academic Major at IUB

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Abstract

Research on academic persistence for university students is well-established, but most often this work is based on secondary analysis of institutional or national datasets. Research on major choice is not nearly as widespread, but most of it also suffers from being based mostly on existing data. The issue with these scenarios is that researchers are limited to what exists and try to answer their own questions in a limited way rather than collecting the best data for the questions of interest. We recently initiated a study to address these limitations. We are working to understand major choice as well as student persistence. We are taking an approach where we plan to learn as much as we can from secondary analysis of a large corpus of longitudinal data as well as conducting our own primary data collection to study student decision-making processes at a much more fine-grained level and as it occurs rather than in post-hoc analysis.

In the proposed work we are going to focus on trying to evaluate the role of peer networks on major choice and persistence. We will come at this from two angle: 1) we will analyze existing institutional data on course enrollments to discover networks based on co-enrollment; and 2) we will analyze data from our ongoing study on major choice to understand how peer networks develop and evolve, and what roles these networks may play in major choice and persistence.

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Background

      We started a project toward understanding students' selection of majors with the intention to look at these choices in a holistic sense. One of the initial findings from that study that has been interesting and that we'd like to understand in greater detail is the influence of peers on these choices. Anecdotally we are told by a number of participants that they are important, but we want to analyze this in much greater detail. We discuss some initial results from Year 1 of the study below.

      While there were no real differences across gender or race/ethnic groups in terms of the number of academic and social friends identified during the semester, Both males (44% vs 37% of females) and minority students (44% vs 35% of majority students) were more likely to indicate that they had a friend who was influential in their thinking about what majors to pursue. Most often these responses reflected support that took form of emotional ("They believed in my abilities and pushed me to follow what I want to do") and in pragmatic ways ("Having a friend that was in the same class to work on papers with"). A few students indicated that their friends were influential in the choice to change majors ("Some friends started off as Chem majors and quickly switched to something that was not so intensive in Chemistry. I felt that switching my major would help in that regard as well"). The intricacies of these relationships and outcomes are one of the key aspects we plan to investigate more within this project.

Sample

      For our investigation of co-enrollment networks we will be using existing institutional data to conduct analysis. These data were obtained from the IU Bloomington Assessment and Research Office and include the academic records of current and former students going back to 1998, based on our established inclusion criteria. These data include academic preparation for university, performance in courses, sequence of courses completed, measures of progression through their degree program, demographics, measures of engagement and credentials earned. In certain cases students may have completed institutional surveys that are tied to their records, and where relevant data are included (e.g., major intention) we hope to include those data in the analysis.

      The sample for the analysis of academic and social friend networks comes from our continuing study of major choice at IUB. In the 2014 cohort this sample was approximately 125 students who participated in many surveys. In the 2015 cohort this sample includes over 500 students from the incoming class. While we survey these students a few times a semester, our collection of data on friends will only occur at the beginning of the year, after the 1st semester and at the end of the year since we do not anticipate these networks of good friends shift that rapidly.

Goals

1) Advance analysis of course-taking data to establish networks of students based on co-enrollment patterns.
2) Advance analysis of social and academic friend network data to understand how these networks develop and evolve over the start of time at university. Also will be looking to identify how similar friends within a network are in terms of academic characteristics.
3) Use research from 1 and 2 to apply for external funding to conduct more extensive research using network analysis to understand major choice.

Current Study

Given the focus of the proposed work is on how developing peer networks relate to major selection and STEM persistence, we plan to use extant data on course enrollments at IUB as well as collect data from a current set of students from our survey program on major choice. We are collecting some data related to these foci in our current study, but will focus more intently on the collection and analysis of these data as we move forward. We collected data at three time points during students' first year on campus to look at the development of friend networks for both social friends and academic friends to investigate how the demographic profiles, academic performance and course-taking of their peers might be associated with their major choices. We have these data but have not been able to advance any analyses yet.

Network analysis will be employed to understand the social factors in persistence from macro and micro levels. Specifically, the corpus of historical course registration records, likely to be over 5 million cases across the campuses, will be used to generate networks on the basis of co-occurrence data in which students will act as nodes and ties will be established on the basis of shared coursework. The strength of the relationship will therefore be determined based on the degree to which they have shared curricular offerings. Time will, of course, prove the most fundamental clustering agent. However, within each time cluster, the networks can be overlaid with basic demographic information to understand the role of homophily in the network (McPherson, 2001). Newman's (2002) approach to analyzing assortative mixing patterns will be employed to examine both the homophily, but also the degree to which this homophily is associated with various metrics of success (e.g., GPAs, persistence). Also examined as possible correlative attributes will be network density and cohesion. This will allow us to identify the degree to which network structure (i.e., clustering coefficient) and homophily (i.e., shared demographic data) are related to success and persistence in STEM fields as compared to NonSTEM fields and how this varies by population type (e.g., majority/minority, men/women).

The historical data provides occurrence data, but lacks affinity data—that is, it is unknown whether the individuals in the cohorts were socially engaged. To this end, the survey data gathered regularly from students will provide rich insight into the degree to which the demographic profiles, academic performance, and course-taking of identified peers is associated with an individual's major choice and persistence. The friendship questions in the survey will provide the basic affinity data. Social network research suggests that five names is the most

efficient number of names to request from an individual via self-report in order to construct an adequate organizational network (Merluzzi & Burt, 2013). To that end, we have asked each student to identify five social friends and five academic friends (and have provided definitions for these labels). The names will then be matched back to the comprehensive demographic and academic records of the listed friends. These data will be used to construct egocentric networks for each of the students in the sample (Carolan, 2014; Wasserman & Faust, 1994). Focusing on the individual, we will examine correlative relationships between the homophily of a personal network (in terms of shared demographic characteristics or metrics of academic success) and the subsequent trajectory and success of the individual.

Additionally, a large-scale network will be constructed to examine relationships among groups by social ties. Given that the data is only a sample of the undergraduate population, it is expected that much of the data will be dyadic in nature (though a massive component might be identified, depending on the cohesiveness of the cohort). Regardless, employing assortative mixing patterns should elucidate whether students with certain characteristics have high propensity for particular outcomes. For example, we will code students by STEM and NonSTEM at each transition point and identify "bridging" students—e.g., students whose friend networks span both the STEM and NonSTEM networks. We will examine whether these students are at a particularly high risk for attrition from STEM. These analyses, in triangulation with the survival analysis, will help to identify high impact times and strategies for intervention.

Potential Impact

The overarching goal of the study is to understand the myriad factors related to student selection of academic majors. We are already finding evidence for what these factors are, but have been limited in the analyses we could advance during the first year. Our plan is to use these funds to pay for graduate student support to help advance the analyses, particularly focusing on peer network development. We are in the basic learning phase at this point, but plan to be able to move into developing and evaluating interventions as the project progresses.