An Exploration of Social Networks for Under-Represented Minority Students in LA-supported Classrooms

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Why diversity is important in STEM?

In 2014, only 30% of students who receive an Undergraduate STEM Degree are of an Under-Represented Minority (URM) background.
- URM includes the following: Black, Hispanic, Am. Indian, and 2 or more race students

Programs exist to contribute to the retention and inclusivity for URM students in STEM:
- Summer-bridge programs
- STEM Outreach programs
- On-campus resources

The Learning Assistant (LA) program could be a new resource that promotes inclusivity and retention for URM students in STEM.

Exploring LA impact on URM students?

Previous studies have shown that LAs impact students through:
- improving higher-order cognitive skills[1]
- improved learning gains in a General Biology II course[2]
- facilitating clicker-question discussions in class[3].

This project focuses on social networks within LA supported classrooms:
- Where do URM students lie within these social networks?
- Is there any significant difference within degree centrality or LA interaction with URM students?

Social Network Analysis

Data Collection:
Social network surveys for courses A and B during Spring 2017/2018

Data Analysis:
- Comparison of Means:
  - Average Degree Centrality (Avg. DC)
  - Average Learning Assistant Interaction (Avg. LAI)
- Network Density
- Course Demographics

Tools used:
- R (statistical programming language, and visuals)
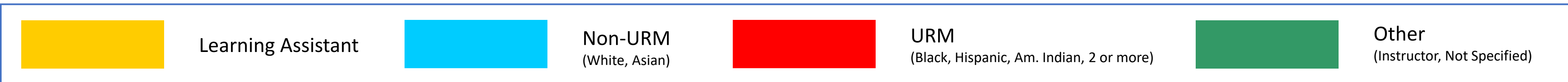- yEd Graphical Editor (visuals)

Discussion & Next Steps

- 3 out of the 4 sections have no significant difference in Avg. DC while URM students in the 4th section (course A, Spring 2018) have a significantly higher Avg. DC than Non-URM students
- Network data reveals that URM students are similarly or more connected than non-URM students, so they are still a part of the overall classroom network and not disadvantaged
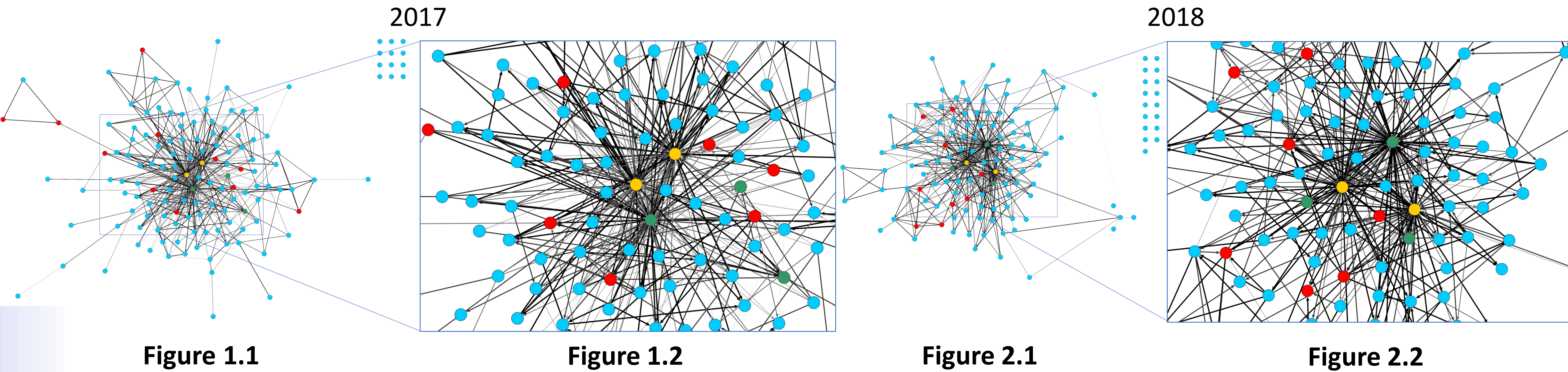
Next steps:
- Focus on more courses with social network data at partner institutions with different demographics
- Analyze current institution data by comparing more social network characteristics (i.e., eigenvector centrality, betweenness, etc.) with demographic data (i.e., course grades, English second language, first-gen. status, etc.)
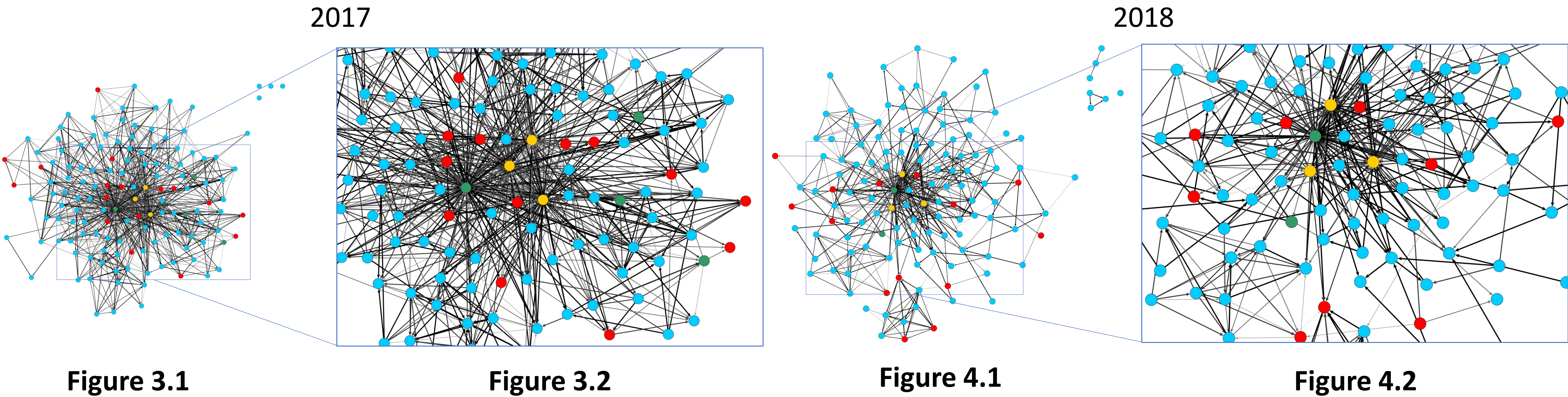
Social Networks for Course A and B

Legend: Learning Assistant | Non-URM (White, Asian) | URM (Black, Hispanic, Am. Indian, 2 or more) | Other (Instructor, Not Specified)

Course A

2017 — Figure 1.1, Figure 1.2   2018 — Figure 2.1, Figure 2.2

Course B

2017 — Figure 3.1, Figure 3.2   2018 — Figure 4.1, Figure 4.2

COURSE	TERM	Spring 2017			Spring 2018		
	Group	n	Avg. DC	Avg. LAI	n	Avg. DC	Avg. LAI
A	URM	11	4.9	2.6	9	7.7	2.5
	Non-URM	124	4.2	2	122	3.9	2
	LAs	2	81		2	69	
	Network Density	0.043			0.042		
B	URM	17	8.7	1.9	14	4.9	0.9
	Non-URM	112	9.6	2.2	116	5.4	1.1
	LAs	3	77.7		3	37	
	Network Density	0.082			0.048		

Course A
- URM students have a significantly higher degree centrality than non-URM students (p < 0.05) in 2018
- 2018 URM students have a higher Avg. DC than 2017 URM students
- Network Density is similar from 2017 to 2018

Course B
- Network Density decreased approximately by ~50% from 2017 to 2018
- Avg. DC for LAs decreased by ~50% from 2017 to 2018
- There's a decrease in Avg. DC and ACG. LAI from 2017 to 2018 for both URM and non-URM students

References

1. Sellami et. al, 2017
2. Talbot et. al, 2015
3. Knight et. al, 2015