STEM Teacher Scholar Recipients and Their Perceptions About Teaching in High-Needs Schools via Cluster Analysis

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Introduction

The latest TIMMS data ranks 4th grade Americans 11th out of 36 nations and 8th graders 9th out of 49 nations on their average mathematics score[1]

In science, 4th graders rank 8th out of 36 nations and 8th graders rank 11th place out of 49 nations[2]

Several reports[3] stress America's competitive edge depends largely on STEM education

Narrowing this achievement gap depends largely on recruiting and retaining highly qualified STEM teachers[4]

Qualified STEM majors are far more likely to not enter or leave teaching[5]

The situation in high needs schools is more troublingly as classes are taught by teachers without proper certification, such as emergency certification[6] and attrition is extremely high[7]

To combat attrition and recruit high quality STEM teachers in to high needs schools, the government has employed a myriad of strategies

One poorly studied strategy is financial incentives

Research Problem

The purpose of this study was to examine the effect of financial incentives on STEM teacher commitment to teach and teach in high needs schools

Methods

Participants were 304 Noyce scholars from 45 institutions currently teaching full or part time responded to our survey

Two-stage hierarchical cluster analysis was used to categorize STEM scholars' perceptions of the Noyce scholarship based on four variables

Variables	Item content	Item option
"Influence of scholarship on becoming a teacher," (Cronbach's Alpha=0.88)	- Become a teacher - Complete the certification program - Take a teaching job	- Not at all influential - Not very influential - Somewhat influential - Very influential
"Influence of scholarship on becoming a high needs school teacher." (Cronbach's Alpha=0.90)	- Teach in a high needs school - Remain teaching in a high needs school for the full term of your commitment - Remain teaching in a high needs school beyond the full term of your commitment	
"Would you have become a teacher if you had not received the Noyce scholarship?"	As the variable	- No - Possibly - Yes
"Would you have decided to teach in a high needs school if you had not participated in the Noyce Scholarship Program?"	As the variable	- No/I have not taught in a high needs school - Possibly - Yes

ANOVA and two-way contingency table analysis were used to examine differences among the clusters

Results

Figure 1: The Within-Cluster Percentage Plot of the Factor "Influence of scholarship on becoming a teacher."

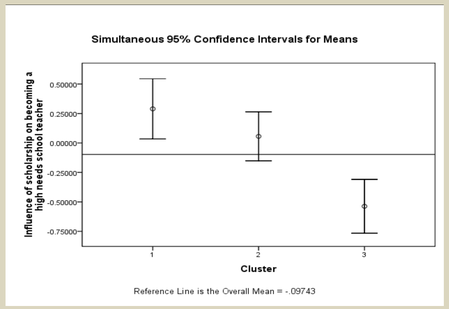

Figure 2: The Within-Cluster Percentage Plot of the Factor "Influence of scholarship on becoming a high needs schools teacher."

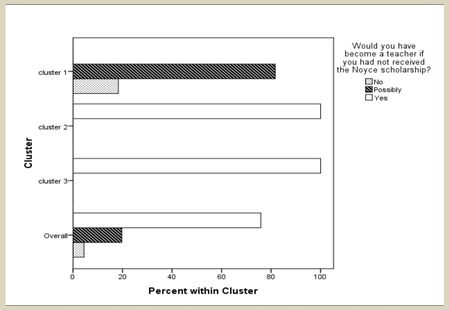

Figure 3: The Within-Cluster Percentage Plot of the Item "Would you have become a teacher if you had not received the Noyce scholarship?"

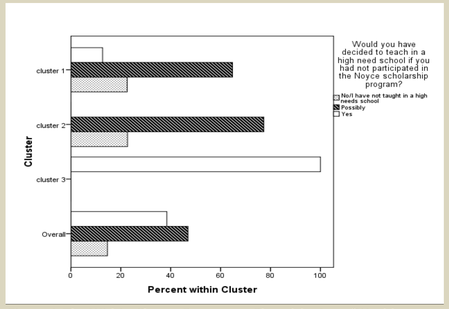

Figure 4: The Within-Cluster Percentage Plot of the Item "Would you have decided to teach in a high needs school if you had not participated in the Noyce scholarship program?"

Demographic characteristics	Cluster 1 (N=71)	Cluster 2 (N=119)	Cluster 3 (N=104)	Total (N=294)	Test Statistic
Race					
*White	46	91	58	195	X^2 =7.6,
*Non-White	23	22	39	84	p=0.004*
Gender					
*Female	49	82	64	195	X^2=1.6 p=0.44
*Male	22	37	40	99	
Highest degree					
*Bachelor's	27	44	41	112	X^2=7.8 p=0.11
*Master's	4	5	6	15	
*Doctorate's	5	1	1	7	
Intention to teach mathematics					
*Yes	22	45	45	112	X^2=2.7, p=0.24
*No	49	74	59	182	
Age – Mean & Standard Deviation	32.2 (1.20)	29.8 (0.71)	31.2 (0.82)	294	F=1.97, p=0.14
GPA – Mean & Standard Deviation	3.53 (0.06)	3.50 (0.04)	3.37 (0.05)	160	F=2.90, p=0.06
Did learn about the Noyce before or after you decided to become a teacher?	22	12	9	43	X^2 =20.1,
*Before	49	107	95	251	p<0.001*
*After					
Do you consider yourself to have made a "career change"?					
*Yes	44	52	51	147	X^2=5.47,
*No	26	63	50	139	p=0.07
I like the flexibility and/or autonomy of STEM teaching					
*Yes	50	88	75	213	X^2=0.71,
*No	19	25	23	67	p=0.70
I feel that a teaching career is conducive to my family life					
*Yes	47	88	80	215	X^2=3.56,
*No	23	26	21	70	p=0.17
I feel this career allows me to "make a difference" in the world					
*Yes	68	110	102	280	X^2=3.21,
*No	2	6	1	9	p=0.020
Cluster 1: Less committed to becoming a teacher and teaching in a high needs school Cluster 2: Highly committed to becoming a teacher but not to teaching in a high needs school Cluster 3: Highly committed to becoming a teacher and teaching in a high needs school					

Discussion

4 variables were identified that differentiated scholars into 3 clusters

Clusters differed significantly by race and timing of teaching decision:

- Non-Hispanic White scholars more likely in cluster 1
- Non-White scholars more likely in cluster 3
- Scholars hearing about scholarship prior to teaching decision more likely in cluster 1
- Scholars hearing about scholarship after to teaching decision more in cluster 3

Non-Hispanic White scholars and scholars hearing about scholarship prior to teaching decision may be influenced by funding to teach

Unclear of how perceptions translate into decisions to remain teaching

Future work should try to tease apart differences between the clusters

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Acknowledgements

Christopher David Desjardins supported by the Interdisciplinary Education Sciences Training Program IES Award # R305C050059 Univ of Minn PRF# 473473 and NSF REC Grant#REC0514884.