

AN EXAMINATION OF THE EFFECTIVENESS OF AN INSTITUTIONAL INTERVENTION TO IMPROVE RETENTION AT AN AGRICULTURAL COLLEGE



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Author Note

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Abstract

Historically, agricultural colleges have primarily attracted students with prior experience in agriculture. However, there is a growing trend of students enrolling without such backgrounds. Recent research emphasizes the need for agricultural colleges to adopt innovative strategies that address the evolving needs of their student body, fostering both retention and academic success. This study assessed the impacts of a college initiative on first to second-year student retention within an agricultural college. Conducted at Colorado State University, a non-experimental cross-sectional predictive design was employed to investigate key variables such as first-year experience course enrollment, first-term GPA, Colorado residency, gender, race, and ethnicity. The results revealed a significant predictive retention rate model ($X^2(4) = 195.625, p < 0.001$) for students who were enrolled in the first-year experience course ($p = .031$). Successfully retained students also had GPAs higher than 2.5 ($p < 0.001$) and had in-state residency status ($p = 0.004$). The findings emphasize the importance of targeted interventions, like first-year agricultural experience courses, in fostering student success and retention within agricultural colleges. This research contributes valuable insights for students and institutions, emphasizing the need to invest in strategies that ensure modern agricultural students' success in their academic environment, thereby

fostering a positive impact on the future agricultural workforce.

Keywords: agricultural colleges, retention, persistence, first-year interventions, first-year experiences

Several factors influence the process of selecting a major and enrolling in college. Agricultural college students' prior agricultural experience has consistently been the most significant factor in choosing an agricultural major (Donnermeyer & Kreps, 1994; Swan & De Lay, 2014; Wildman & Torres, 2002). However, the number of students arriving at colleges of agriculture with prior agricultural experience is increasingly in the minority compared to their peers (Foreman et al., 2018; Swan & De Lay, 2014). This shift in the demographic makeup of the agricultural student body is a response to the National Research Council's call for agricultural colleges to represent better the modern U.S. food and agriculture system to meet the growing global food and fiber demands (Wildman & Torres, 2002). As agricultural colleges opened their doors to represent a more diverse and comprehensive view of the system of agriculture, they began attracting a broader student body who had not traditionally been part of this academic space (Buchanan, 2008; Codallo et al., 2019). While contributing to the enhancement and advancement of the agricultural industry, this situation poses a significant challenge for agricultural colleges in recruiting (Solomonson et al., 2023)

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and addressing the diverse needs of their student body, as agricultural experience still plays an integral role in a student's success in agricultural colleges (Codallo et al., 2019).

At Colorado State University (CSU), “nearly two-thirds come to Colorado State University with interest in animals or food systems but without a background in agriculture.” (Colorado State University, n.d.). Furthermore, the College of Agricultural Sciences maintained an average second-fall retention rate of 71.57% between fall 2000 and fall 2017, indicating that 28.43% of the new and transfer students did not return for a second year (Colorado State University, n.d.). Recognizing the critical first-year period for students (Tinto, 1999), institutions may turn to implement interventions like first-year experience courses (FYE) to improve the first-year college experience for students (Davis et al., 2019; Erickson & Stone, 2012).

Agricultural colleges have two primary motivations for creating a positive student experience and investing in retention initiatives. The first is linked to student tuition revenue and attrition costs (Erickson & Stone, 2012), and the second is the growing global demand for educated and skilled agricultural professionals (White, 2023). Agricultural institutions need to comprehend and implement effective strategies to recruit and retain today's agricultural students, ensuring their success and the future of agriculture.

Overview of the Contemporary Agriculture Systems Colorado State University Course

To address the issue of first- to second-year retention and improve the first-year experience for students, the College of Agricultural Sciences at CSU introduced the Contemporary Agriculture Systems (CAS) course in 2017 as an FYE course. Inspired by Vincent Tinto's Institutional Departure Model (1993), CAS aimed to create a positive institutional experience for students. Students were provided with intentional agricultural experiences to foster meaningful interactions with peers, faculty, and industry professionals to equalize agricultural opportunities. The course explored relevant concepts for agricultural practices and college success directly from the (corn) field.

Students met weekly for 3.5 hours throughout the semester, alternating between field trips and debrief weeks. Field trips involved visits to production sites, learning from industry leaders, and writing reflections. Debrief weeks, led by peer mentors, focused on discussing and expanding on the prior week's agricultural experiences in small groups. Students collaborated in groups of seven to ten, exploring diverse aspects of agriculture and reflecting on their learning journey. At the end of the semester, each student completed a project, analyzing experiences, identifying challenges, and proposing solutions to those challenges while also identifying potential career paths in agriculture. They presented their findings in an academic poster session and wrote a final reflection on the collaborative learning experience.

Limited knowledge exists on the effects of FYE programs in agricultural colleges. Researchers stress the need to assess FYE in this context to understand its impact

on agriculture student persistence (Foreman et al., 2018; Robotham & Windon, 2023). This study investigates the predictive effects of influential variables such as enrollment in an FYE on first-to-second-year retention. In addition to FYE, specific student characteristics may influence continuity into the second year. Such insights are crucial for students and colleges, as they produce individuals who contribute significantly to the future agricultural workforce (White, 2023). Investing in student success and persistence is an investment in the future of agriculture.

Purpose and Objectives

This study explored the predictive effect of an FYE course (CAS) on students' persistence from year one to year two. As part of a more extensive investigation into the effects of the CAS course, quantitative data from five course offerings were used to examine the course effects. Following Dr. Vincent Tinto's departure model (1993), the research hypothesized that students who participated in the CAS course would have higher retention rates than non-enrollees. Key variables such as gender, residency, race, ethnicity, and first-term GPA were examined for their potential to predict retention. The null hypothesis suggested no retention differences based on CAS course enrollment, regardless of these variables.

Theoretical Framework

While extensive research, including Tinto's Institutional Departure Model (1993), has contributed to understanding postsecondary retention, these theories often lack generalizability due to the unique characteristics of each institution and its stakeholders; each postsecondary institution, its faculty, and its students possess unique characteristics that make it distinct (Aljohani, 2016). This variability hinders the practical application of retention research across different contexts. Therefore, agricultural colleges warrant specific attention in retention research. Tinto's Institutional Departure Model (1993) attempts to explain why students leave an institution before completing their degree. Tinto's Institutional Departure Model highlights the role of pre-entry attributes, goals, and institutional experience on students' ability to integrate and persist through their postsecondary experience. This study used aspects of Tinto's model (1993) to guide the research questions, selection of pre-entry attributes, and institutional experience.

Pre-entry Attribute Variables

This study investigated pre-entry attributes cited as being associated with predicting higher education retention, as outlined in Tinto's model (1993) and validated by Murtaugh et al. (1999). Specifically, the study focused on gender and residency, recognized as significant factors influencing post-secondary retention. (Grosset, 1992; Loye et al., 2020; Murtaugh et al., 1999; Tinto, 1993). Prior research conducted at CSU, College of Agricultural

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Sciences by Archibeque-Engle and Gloeckner (2016) found that females demonstrated a higher persistence rate than males. This aligns with recent broader research, like Loye et al.'s study in 2020, indicating a consistent trend of higher college persistence among women compared to men.

Regarding residency, Archibeque-Engle and Gloeckner (2016) also found that students who were Colorado residents were more likely to persist than their non-resident counterparts. This finding again aligned with broader prior research (Murtaugh et al., 1999). Ethnicity and race were also considered as variables; prior research at this institution found that non-white, minority students have struggled to persist at this agricultural college (Archibeque-Engle & Gloeckner, 2016). Other research corroborates this, but many findings regarding understanding the true impact of race and ethnicity on persistence remain inconclusive, as noted by Choi et al. (2020), Fletcher and Tienda (2010), Murtaugh et al. (1999) and Sweat et al. (2013).

Institutional Experience Variables

Tinto's model maps the institutional experience, encompassing academic and social systems that shape students' time at their institution. The first year of a student's time at an institution is centered around finding compatibility, making the positivity of their first year, and the smoothness of their transition critical (Bean, 1982; Cabrera & Nora, 1993; Pascarella, 1980). FYE courses such as CAS are considered a part of the institutional experience in this study. The general objective of FYE is to facilitate students' smooth integration into their new academic and social environments (Erickson & Stone, 2012; Jamelske, 2009). FYE programs vary based on college needs, aiming to integrate students into academic and social systems. Like retention, the success of these interventions depends on various institutional and individual variables that may or may not be within the institution's bandwidth to control. Though these programs are grounded in research, recent evidence suggests differing evaluations of their actual impact on student success and retention (Barton & Donahue, 2009; Davis et al., 2019; Erickson & Stone, 2012; Klein, 2013; Porter & Swing, 2006; Smith, 2021). This information reinforces the need to examine the impact of FYE courses within the context of agricultural colleges to address retention challenges. The institutional experience variable examined in this study is GPA, a dependable predictor of retention, particularly during the first-to-second-year transition. A higher GPA indicates more remarkable student persistence, as Allen (1999) and Tinto (1993) noted.

Methods

This study's primary method of inquiry was a non-experimental, cross-sectional predictive study to determine quantitatively if the predictor variables of CAS enrollment, first-term GPA, Colorado residency, gender, race, and ethnicity impact retention from the first to the second year of school within the College of Agricultural Sciences. Intact classes were selected for this study. There was no experimentation or manipulation through this process, as

the given purpose was to determine predictability and no correlation (Johnson, 2001). This data was derived from existing data sets of student information obtained by CSU from two sources. The first source was existing data from the Institutional Research, Planning and Effectiveness public database hosted by the Office of the Provost and the Executive Vice President at Colorado State University (n.d.). The second source was also from an existing CSU student database called Ram Select. This database is not public and is protected by FERPA. The research team removed all identifying information using a triangulation strategy. Multiple research team members reviewed the coded data to verify that identifiers were absent (Adams et al., 2015). The research was submitted and approved under IRB protocol #2583 at Colorado State University.

This study analyzed data from five annual course offerings from 2017 to 2021. Participants in the study were first-year agricultural students at CSU who voluntarily enrolled or were registered by their advisors into the CAS course. The IRB protocol approval requirements established consent procedures. Written permission was not required due to the minimal risk involved in the study, the use of existing data, and the absence of procedures outside the research context. After the existing data was compiled, scrubbed of identifying information, and organized, data analysis was conducted to evaluate the null hypothesis.

Participants

The target population consisted of new College of Agricultural Sciences students enrolled from fall 2017 to fall 2021, specifically fall starters who entered as agriculture majors. Additional parameters were set for the CAS course participant sample within the identified student population. These parameters included being new to an agricultural major for less than two semesters. Exceptions were made for students who entered the College during the spring of 2020 during the COVID-19 pandemic or were transfer students. A total of 179 students were enrolled in the CAS course during the study period, and 1267 students who did not enroll in the CAS course were included in the data analysis.

Limitations of the Study

This research acknowledges several limitations. The selection of pre-entry attributes like gender, residency, and race/ethnicity was shaped by data availability, possibly introducing convenience bias. However, these variables align with prior literature on retention prediction (Tinto, 1999). While a randomized control experiment is preferred for credibility, it was not feasible due to the small sample size and reliance on existing data. Still, the research design is supported by evidence of the effectiveness of FYE intervention.

The CAS course, a one-credit, 3-hour weekly class with field trips, is a critical component of this study but has limited duration, which affects data interpretation. Retention is complex, involving factors like first-term GPA, residency, and race/ethnicity, though this study did not account for

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extraneous variables such as skills, prior schooling, and individual goals (Tinto, 1993). Additionally, the study occurred during the COVID-19 pandemic, which may have influenced sampling and results.

Analysis Procedures

Once the data was compiled into a cohesive spreadsheet, analysis began using the IBM Statistical Package for Social Sciences (SPSS). Descriptive statistics were first conducted to summarize and describe the characteristics of the students in the data set. These characteristics included first-term GPA converted to a Z-score (continuous scale), gender (0=male, 1=female), residency (non-Colorado resident =0, Colorado resident =1), ethnicity (0=Non-Hispanic/ Latino, 1=Hispanic/ Latino), race (0=no, 1=yes) which describes yes or no of identification with various races, and CAS course enrollment (0= did not enroll, 1= did enroll).

Next, chi-square tests were conducted to determine a significant association between CAS Course enrollment and first to second-year persistence. The independent variable in the chi-square analysis was CAS Course enrollment (0= did not enroll, 1=did enroll), and the dependent variable was persistence (0= did not persist, 1= did persist). A chi-square priori alpha level of .05 was followed to ensure the validity of the measures (Johnson & Christensen, 2012), and percentages were produced to represent these students' pre-entry attributes, enrollment data, and first-term GPA.

Lastly, logistic regression was performed to predict the probability of first to second-year persistence in the College of Agricultural Sciences. Persistence was measured on a dichotomous scale (0=did not persist, 1= did persist) against the following independent variables, which were examined in the two prior analysis steps: first-term GPA (continuous), gender (0=male, 1=female), residency (1= Colorado resident, 0= not a Colorado resident), ethnicity (0=Non-Hispanic/

Latino, 1=Hispanic/Latino), race (0=no, 1=yes) and CAS Course enrollment (0= did not enroll, 1= did enroll).

To achieve a parsimonious model, the method of entry of variables followed a sequential block entry procedure using prior literature, including Tinto's model (1993) of retention. The research team began with a null model with no predictor variables, and then subsequently, a second model incorporating all variables was constructed to assess any enhancements in model fit ($X^2(12) = 206.324, p < 0.001$). Given the observed improvement, a third iteration involved a model exclusively comprising statistically significant predictor variables ($X^2(4) = 195.625, p < 0.001$). Comparative analysis against the prior model confirmed a considerable overall enhancement in the model (see Table 1).

Results and Discussion

The findings of this study are divided into two parts to examine the study's results cohesively. First, the descriptive statistics illustrate the characteristics of this student group, including CAS Course enrollment and first-to-second-year retention data. The second section reports the chi-square analysis and logistic regression analysis to assess the extent of influence exerted by potential predictor variables on the phenomenon of first-to-second-year retention.

Descriptive Results

Table 1 shows the descriptive statistics synthesizing pre-entry attributes and institutional experience data, providing insight into the first-year student population in the College of Agricultural Sciences from 2017-2021. This analysis helped identify characteristics potentially significant for retention, including first-to-second-year retention rates, CAS course enrollment, gender, race/ethnicity, residency, and first-term GPA.

Table 1

Sequential block entry for Logistic regression

Variables	Model 1 (null)				Model 2 (all variables)				Model 3 (significant variables)			
	B	SE	Wald	p	B	SE	Wald	p	B	SE	Wald	p
Constant	1.519	.069	488.716	.000	-177.171	105.439	2.823	.093	1.558	.104	222.512	<.001
Beginning residency					.450	.159	8.059	.005	.451	.157	8.285	.004
Gender					-.253	.172	2.165	.141				
Hispanic					-.386	.196	3.902	.048	-.317	.190	2.785	.095
American Indian					-.802	.603	1.768	.184				
Asian					-.330	.594	.309	.578				
Black					-1.021	.591	2.983	.084				
Hawaiian					-.774	.865	.800	.371				
White					-.490	.509	.929	.335				
Multi race					.369	.652	.319	.572				
CAS course enrolled					.603	.273	4.870	.027	.579	.268	4.660	.031
First term GPA					.866	.072	145.263	.000	.878	.070	156.079	<.001.
Year of enrollment					.089	.052	2.892	.089				

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First to Second-Year Retention

This study found a first-to-second-year retention rate of 82.8% from 2017-2021 (see Table 2). This contrasts with the College of Agricultural Sciences' average retention rate of 71.7% from 2000-2016, as reported by CSU (n.d.) (see Table 3). The noticeable increase in retention piqued our research team's interest. Although the inclusion criteria in our study differed slightly from the institution's due to variations in sampling, the substantial rise between 2017-2021 and 2000-2016 led us to investigate potential factors behind the improved retention rate over the past 16 years.

Table 2

Estimated 2nd-year retention for CAS students, 2017 to 2021

	1 st year		2 nd year	
	<i>f</i>	%	<i>f</i>	%
College of Agricultural Sciences	1446	100.0	1197	82.8

Table 3

College of Agricultural Sciences retention (2000). -2016, according to CSU data

	1 st year		2 nd year	
	<i>f</i>	%	<i>f</i>	%
College of Agricultural Sciences	3,612	100	2589	71.7

Pre-entry Attributes

Analyzing student characteristics was crucial for investigating retention in the agricultural college. The analysis from 2017 to 2021 revealed key insights into the attributes of agriculture majors at CSU that may have influenced their persistence from the first to the second year. The examination of race and ethnicity statistics among the student population in this study documented that most ($f = 1308$, 90.5%) CAS students identified as "White". Less than a quarter ($f = 233$, 16.1%) of students identified as "Hispanic." See Table 4 for a summary of descriptive data for demographic variables.

Table 4

Race and ethnicity of College of Agricultural Science students from 2017-2021

	Categories	<i>f</i>	%
Race	American Indian	63	4.4
	Asian	89	6.2
	Black	53	3.7
	Hawaiian	12	.8
	White	1308	90.5
	Multi-Race	97	6.7
Ethnicity	Hispanic	233	16.1

Table 5

Gender of College of Agricultural Science students from 2017-2021

Gender	<i>f</i>	%
Female	1097	75.9
Male	349	24.1
Total	1446	100.0

Three-quarters of students ($f = 1097$, 75.9%) identified as female. Table 5 provides a summary of descriptive data for gender variables.

Another pre-entry attribute under consideration was residency. According to the analysis results, over half ($f = 843$, 58.3%) of students identified as out-of-state residents at the time of their enrollment in the College of Agricultural Sciences. This proportion varies slightly over time as students obtain Colorado residency by the end of their college careers ($f = 635$, 44.0%). Initially, many students are from out of state ($f = 843$, 58.3%). However, the percentage shifts over time—where 44% eventually acquire Colorado residency—this may suggest that students sought to take advantage of in-state residencies for various reasons, including reduced tuition cost. More research is needed to investigate students reasoning for shifting residency (noted in Table 6).

Table 6

Residency for College of Agricultural Science students from 2017 to 2021

	Colorado Residence Start		Colorado Residence End	
	<i>f</i>	%	<i>f</i>	%
Not Resident	843	58.3	809	56.0
Resident	603	41.7	635	44.0
Total	1446	100.0	1444	100.0

Note. Colorado Residence end represents the students' residency at the end of their enrollment in the College of Agricultural Sciences. According to our data, two individuals' data were reported as missing in SPSS for the Colorado Residence end.

Institutional Experience

The data set comprised 1,446 students enrolled from fall 2017 to fall 2021. Within this group, 179 students (12.3%) actively participated in the CAS course (see Table 7). This data encompassed the entire population of eligible students in the College of Agricultural Sciences, with CAS course enrollment as the institutional experience variable.

Table 7

Total College of Agricultural Science students from 2017-2021 considered in the study

Category	<i>f</i>	%
Did not enroll in the CAS course	1267	87.8
Enrolled in CAS course	179	12.3
Total	1446	100.0

Note. CAS students are separated into two groups: CAS course enrollees, and students who did not enroll. The total amount makes up the student population.

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Data analysis showed that students enrolled in the College of Agricultural Sciences from 2017 to 2021 had an average first-term GPA of 2.91, with significant variability ranging from a low of 0.00 to a high of 4.00. Among this cohort, CAS course enrollees had a higher average first-term GPA of 3.01 ($f=179$) than non-enrollees, who averaged 2.89 ($f=1,297$).

Building on this foundational understanding, the data analysis further explored the dynamics of first-to-second-year retention rates within the student cohort. Guided by the descriptive results, the objective was to determine whether factors such as CAS course participation or specific student characteristics significantly influenced retention from the first to the second year of study.

Investigation into Variables Influencing Retention

Building on the insights from descriptive statistics, researchers further examined the impact of the identified predictor variables on first-to-second-year retention using chi-square and logistic regression analyses. This approach offered a more nuanced understanding of how these predictor variables contributed to the complex dynamics of student retention within the College of Agricultural Sciences at CSU.

The logistic regression model containing all predictors was significant, $X^2(12) = 206.324$, $p < 0.001$. The model explained 21.9% (Nagelkerke R^2) of the variance in year one retention and correctly classified 85% of the cases. Additionally, the model's sensitivity was 98.4%, which explained the number of true positives of individuals who did persist from year one to year two. Since the model proved to be significant, the variables were then evaluated on an individual level in the logistic regression model. It was found that Colorado residency at the start of college ($p=0.005$), Hispanic ethnicity ($p=0.048$), CAS Course ($p=0.027$), and first-term GPA ($p < 0.001$) were found to be statistically significant in impacting first to second-year retention from the 2017- 2021 student data set.

As a result of those findings, a simpler model was constructed. This model, which included only the identified significant variables from the first model (residency, Hispanic ethnicity, CAS Course, first-term GPA), was designed for clarity and ease of understanding. The second model was also significant $X^2(4) = 195.625$, $p < 0.001$, and this new model explained 20.9% (Nagelkerke R^2) of the variance in

persistence from year one to year two, which was slightly less than the first model. The model also correctly classified 85.4% of the cases, and the sensitivity was 98.4%; both numbers were the same as the first model, indicating again the number of true positives that described each student considered in the sample.

The analysis of the simpler model found that three of the four predictor variables were statistically significant in predicting first to second-year retention between 2017 and 2021: first-term GPA ($p < 0.001$), CAS Course ($p=0.031$), and Colorado residency at the start of college ($p=0.004$). These findings underscore the weight of our research. First-term GPA significantly influenced persistence, followed by Colorado residency and CAS Course enrollment. For each one-point change in a student's GPA, they were 2.40 times more likely to persist from year one to year two. Students who enrolled in the CAS Course were 1.78 times more likely to persist from year one to year two than those who did not enroll. Lastly, students who were Colorado residents at the start of college were 1.57 times more likely to persist than those who were not Colorado residents.

Summary

Among the evaluated variables, first-term GPA, residency status, and CAS course enrollment were significant factors influencing student persistence from the first to the second year. The findings, derived from logistic regression analysis, provided valuable insights into the characteristics of agricultural students at CSU, emphasizing the complex interplay of academic performance, residency, and targeted interventions in shaping their academic trajectories.

First-Term Grade Point Average (GPA)

First-term GPA is a critical early indicator of student success (Gershenfeld et al., 2016). The results of this study reinforce this notion, demonstrating that for each one-unit increase in GPA, students are nearly 2.5 times more likely to persist into their second year of study. Additionally, institutional activities promoting student investment (Tinto, 1999), socialization (Ennen et al., 2015), and first-year success, such as first-year seminars or FYE courses, also contribute to higher first-year GPAs (Pascarella & Terenzini, 1991; Svanum & Bigatti, 2006). Descriptive statistics from this study highlight that, on average, participants in the CAS course achieved a higher first-term GPA than non-

Table 8

Logistic regression predicting the likelihood of a student persisting from year one to year two in the College of Agricultural Sciences

	B	S.E.	df	p	Odds Ratio	95% CI for Odds Ratio	
						Lower	Upper
Z score: first-term GPA	.878	.070	1	<.001	2.407	2.097	2.763
CAS course enrolled (1)	.579	.268	1	.031	1.785	1.055	3.021
Hispanic (1)	-.317	.190	1	.095	.728	.502	1.057
Resident Start of college (1)	.451	.157	1	.004	1.571	1.155	2.136
Constant	1.558	0.104	1	<.001	4.747		

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participants. Like retention, numerous institutional and individual influences can support or hinder a student's academic success. Therefore, institutional factors that holistically impact students may contribute to an overall sense of happiness and success during their college experience.

Residency

The results revealed the importance of residency, showing a significant association with student persistence. In-state residents were 1.5 times more likely to persist than their out-of-state counterparts. This finding aligns with previous research that has consistently identified disparities in the postsecondary experience based on residency status (Murtaugh et al., 1999). Factors influencing this disparity include differing tuition structures, the development of a sense of community (Tinto, 1993), and proximity to essential support systems such as family and pre-university friends (Murtaugh et al., 1999). The study results further validate the impact of residency on student success, highlighting the complex nature of these differences. Addressing these disparities is essential for institutions aiming to enhance the college experience and improve retention rates, ultimately fostering a more inclusive and supportive learning environment.

CAS Course Enrollment

Finally, this study's primary predictor variable of interest was the impact of enrollment in the CAS Course, a college-led first-year experience initiative designed to provide first-year students with agricultural experiences that enhance their fall semester and promote overall student success. According to the study results, CAS Course participation was deemed a significant predictor of retention in the first to second year. Those who had enrolled in CAS Courses between the fall of 2017 and 2021 demonstrated 1.7 higher odds of persisting to their second year than their counterparts who did not. Despite research presenting a mixed response on the effectiveness of first-year intervention courses (Davis et al., 2019; Jamelske, 2009; Smith, 2021), this intervention highlighted effectiveness within the distinctive context of CSU, College of Agricultural Sciences. The study results from FYE course participation hold paramount importance within agricultural colleges as these experiences may assist students with persisting in agricultural majors.

The critical facets of the CAS Course include its focus on providing first-year students with hands-on experiences directly aligned with their academic and professional pursuits, fostering a sense of community through student, peer mentor, and faculty connections, and experiential learning in agriculture. This approach provides students with a tangible understanding of their agricultural student experience and future potential agricultural pursuits.

Institutions such as CSU, can leverage these findings to shape future student retention strategies explicitly tailored for their agricultural colleges and agricultural students. For instance, the results underscore the worthwhile investment of university resources in first-year interventions, as evidenced

by the positive impact on retention rates. It is imperative, however, to extend these experiences thoughtfully to address the unique needs of students from historically marginalized groups, recognizing that their requirements may differ from those of non-historically marginalized groups. The research team noted that among all racial or ethnic groups, only Hispanic ethnicity exhibited significance in either logistic model. Recent research highlights a nationwide trend indicating that Hispanic students pursue post-secondary education (Hernandez & McElrath, 2023). In the context of this study, Hispanic ethnicity was the second most prominent group (constituting a meager 16%). However, these students were also less likely to persist from the first to the second year, regardless of their participation in the FYE intervention, residency status, or GPA within the agricultural college. This finding stresses the importance of considering how to tailor interventions to address the specific challenges faced by different racial and ethnic groups within the agricultural academic landscape (Archibeque-Engle & Gloeckner, 2016).

While this study identifies critical predictors crucial for understanding agricultural student retention, it is essential to recognize that retention is a complex issue influenced by numerous factors. The significance of these predictors may vary across institutions and contexts. When applying these findings, institutions should consider their unique student populations and contextual factors. Future research should explore the enduring effects of first-year interventions like the CAS Course, delving into their impact on agricultural students' agricultural journey, including identity, agricultural literacy, and career aspirations. These insights would guide colleges in optimizing the design and delivery of similar programs. Other future research could explore the influence of additional student variables during their first year on campus, such as their level of engagement in student organizations, whether they live on campus, credit load, and their employment status- including the number of hours they work.

Given the observed disparities between historically marginalized and white students, future studies should conduct an intersectional analysis of the intervention's effects, shedding light on challenges and opportunities for underrepresented groups in the agricultural academic landscape. Future research should employ a multifaceted approach, combining quantitative and qualitative methods to capture the nuanced dynamics of student experiences and understand persistence in agricultural colleges. This approach will facilitate a comprehensive understanding of long-term effects, informing evidence-based policies that create an equitable, supportive, and empowering educational environment for all agricultural students.

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