9-12-2024

The Impact of COVID-19 on Undergraduate Students' Academic Performance at the University of Texas at Arlington

Mohamed Abdalati

Follow this and additional works at: https://mavmatrix.uta.edu/stimulus

Recommended Citation

Abdalati, Mohamed (2024) "The Impact of COVID-19 on Undergraduate Students' Academic Performance at the University of Texas at Arlington," *Stimulus: A Medical Humanities Journal*: Vol. 4, Article 39. Available at: https://mavmatrix.uta.edu/stimulus/vol4/iss1/39

This Article is brought to you for free and open access by the Mavs Open Press Open Access Journals at MavMatrix. It has been accepted for inclusion in Stimulus: A Medical Humanities Journal by an authorized editor of MavMatrix.

The Impact of COVID-19 on Undergraduate Students' Academic Performance at the University of Texas at Arlington

The Impact of COVID-19 on Undergraduate Students' Academic Performance at the University of Texas at Arlington

Mohamed Abdalati

Supervising professor: Whitney Tholen, Ph.D. December 2023

The Department of Biology and Microbiology, The University of Texas at Arlington, Honors College

Abstract

The Coronavirus COVID-19 pandemic has brought unprecedented challenges to higher education, impacting students' academic performance. This study investigates the effects of the pandemic on Microbiology undergraduate students at the University of Texas at Arlington (UTA) from 2019 to 2022. A retrospective cohort study design was employed, analyzing academic records of 3,059 Microbiology undergraduates. Results indicate a significant decline in academic performance during spring 2020 and 2022. Lab grades dropped from 88.0 to 82.5, while overall class averages fell from approximately 87 to 82.5. A literature review explored the relationship between socioeconomic status (SES) and academic performance during the pandemic. Lower SES students experienced more substantial declines, highlighting the pandemic's exacerbation of educational disparities. This study reveals the COVID-19 pandemic significantly impacted students in higher education as indicated by academic performance at UTA. Findings emphasize the need for tailored interventions and equitable education strategies to support students navigating unforeseen disruptions.

Introduction

The COVID-19 pandemic, a global health crisis initiated by the emergence of SARS-CoV-2, has significantly impacted various sectors, including education. This disruption necessitated rapid shifts in educational methodologies, particularly in higher education, with a substantial transition to remote learning modalities to ensure educational continuity (UNESCO, 2020).

The pandemic's transition to online learning presented unique challenges for both students and educators. The abrupt shift required significant adjustments in pedagogical approaches and the development of online curricula (Al Lily et al., 2020; Arias, 2019). Disciplines requiring practical components, such as Microbiology, experienced significant impacts due to the closure of laboratories and restrictions on in-person interactions, hampering hands-on practical experiences for

The Impact of COVID-19 on Undergraduate Students'
Academic Performance at the University of Texas at
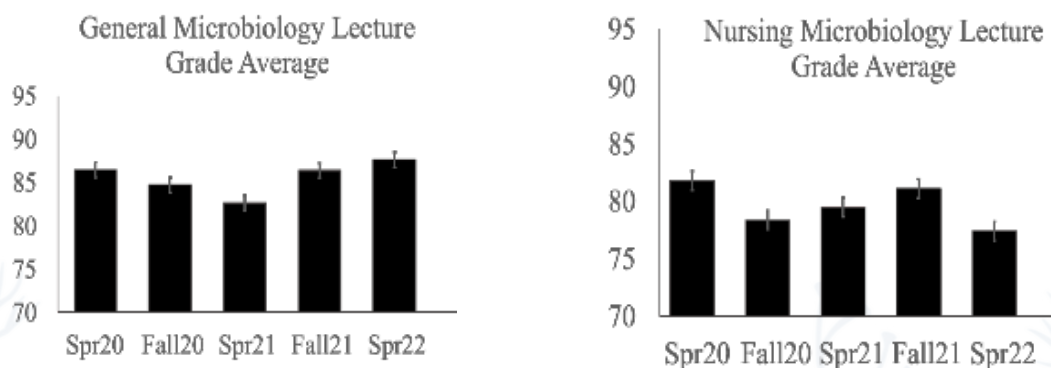Arlington

Mohamed Abdalati

students (Pearse et al., 2023; Restini et al., 2023). Furthermore, the pandemic had profound implications on students' mental health and well-being. The transition to remote learning, coupled with uncertainties and anxieties surrounding the pandemic, resulted in increased stress and anxiety levels among students (Cao et al., 2020; Shin et al., 2023). Educational institutions implemented various measures to provide mental health resources and support services to address students' psychological needs (Villatoro et al., 2023; Yang et al., 2021). This research aims to investigate the multifaceted impact of the pandemic on the academic performance of undergraduate students in the Microbiology program at UTA. It explores the challenges in instructional delivery, mental health implications, and the resultant variations in academic performance during this period.

Methods

This research employed a retrospective cohort design, targeting undergraduate students in the Microbiology program at UTA. The study spanned from the Fall semester of 2019 to the Fall semester of 2022, capturing data from both pre-pandemic and pandemic periods. This time frame was strategically selected to provide a comprehensive understanding of the pandemic's impact on academic performance.

Data collection focused on academic records, specifically grades in Microbiology courses. To ensure the protection of student privacy and adherence to ethical standards, all data handling procedures were in strict compliance with the University's Institutional Review Board (IRB) guidelines. Personal identifying information was excluded from the dataset to maintain confidentiality. The analysis was bifurcated into descriptive and inferential statistical methods. Descriptive statistics provided a foundational understanding of the overall grade trends and distributions. Inferential statistics, including t-tests and ANOVA, were employed to assess the significance of differences in academic performance across the analyzed periods. Special attention was given to the effects of the transition to online learning and the pandemic's disproportionate impact on students from varied socioeconomic backgrounds.

Socioeconomic Status (SES) Consideration was a key component of the analysis of examining the influence of SES on academic performance. This involved a detailed exploration of how students from different SES backgrounds were affected differently by the transition to online learning and other pandemic-related educational challenges. Ethical Compliance and Data Integrity: The study maintained the highest standards of ethical compliance and data integrity. All procedures were reviewed and approved by the University's IRB, ensuring that the research adhered to the ethical guidelines for academic research.

The Impact of COVID-19 on Undergraduate Students'
Academic Performance at the University of Texas at
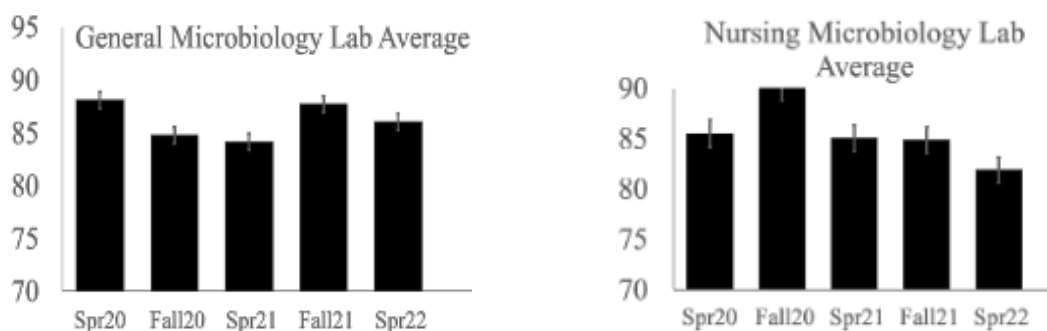Arlington

Mohamed Abdalati

Fig 1. General and nursing microbiology students' Lec/Lab grade average across multiple semesters. (a) The x-axis represents the grade averages in general microbiology lectures while the y-axis shows correspondent semesters. (b) The x-axis represents the grade averages in the general microbiology lab while the y-axis shows correspondent semesters. (c) The x-axis represents the grade averages in the nursing microbiology lab while the y-axis shows correspondent semesters. (d) The x-axis represents the grade averages in nursing microbiology lecture while the y-axis shows correspondent semesters.

Results

The comprehensive analysis of academic records for Microbiology undergraduates at UTA demonstrated a marked decrease in performance metrics during the peak of the COVID-19 pandemic. Specifically, the average lab grade in general microbiology plummeted from an 88.0 in the spring of 2020 to 82.5 in the spring of 2021. Concurrently, the overall class average experienced a similar downturn from approximately 87 to 82. This trend was mirrored in the nursing microbiology cohorts, which saw a decline in average grades from 82.0 to 78.0 over the same periods.

The grade distributions, as depicted in Fig.1 , elucidate the broader academic impact across consecutive semesters. The decline is graphically represented, showing the comparative semester-wise performance before and during the pandemic. Despite the overall downward trend, an intriguing anomaly was observed in the lab-only averages for Nursing Microbiology. There was an upswing from approximately 86 in spring 2020 to around 90 in spring 2021. This contrast might be attributable to adaptations made to accommodate nursing students, many of whom were actively engaged in the healthcare response to the pandemic. The tailored flexibility in coursework seemingly translated into a relative improvement in academic outcomes for this subgroup.

The subgroup analysis focusing on the SES impact revealed stark disparities. Students from lower SES backgrounds were disproportionately affected, with a more significant drop in academic performance relative to their higher SES peers. This is in line with Bulman's findings (2022) on educational inequities exacerbated during the pandemic. Furthermore, the pandemic's fallout included decreased college attendance among lower SES student's post-lockdown, potentially reflecting the exigencies of work and family care prevalent in these groups (Fig.2).

The Impact of COVID-19 on Undergraduate Students'
Academic Performance at the University of Texas at
Arlington   Mohamed Abdalati
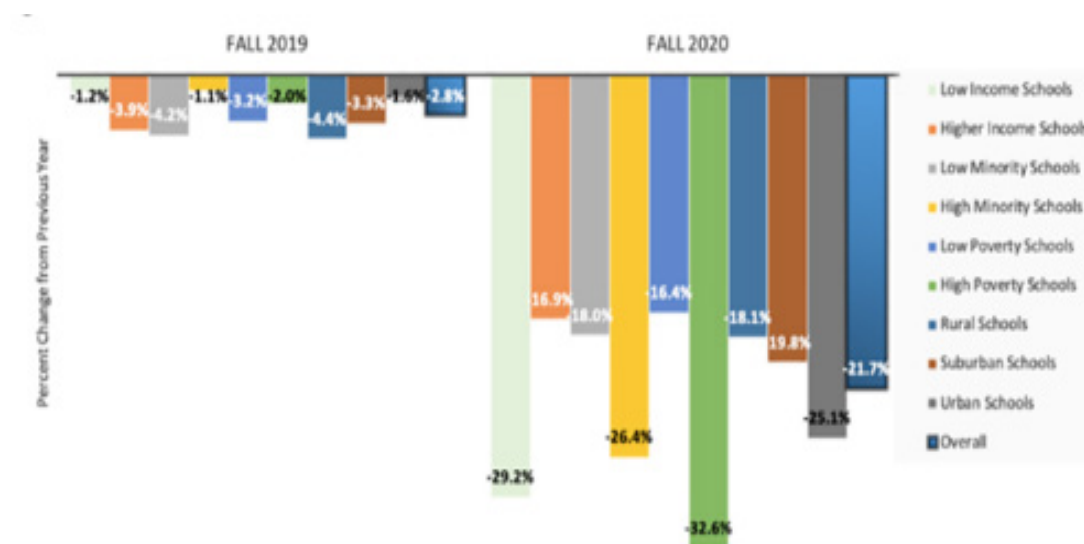

Fig. 2. Changes in Number of Students Enrolling in College After High School by Income Characteristics (from National Student Clearinghouse Center, High School Benchmarks, 2020.)
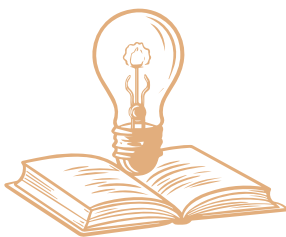
The results collectively underscore the profound effect of the pandemic on the academic trajectory of microbiology students at UTA. The pervasive decline in grades across the board, with pronounced SES-based disparities, highlights the critical necessity for robust and responsive support systems. These systems should not only facilitate academic engagement during disruptions but also provide a safety net that accounts for diverse socioeconomic backgrounds.

Discussion

The observed decline in academic performance, particularly during the spring of 2020 and 2021, aligns with global trends noted during the pandemic. As institutions rapidly shifted to online modes of instruction, the quality and effectiveness of educational delivery were inevitably impacted. However, the disparity in this decline, with students from lower SES backgrounds bearing the brunt, resonates with historical educational disparities accentuated by socioeconomic factors. Such findings mirror the research by Catalano et al. (2021), highlighting how disadvantaged communities often face the most significant educational challenges. The pronounced technological disparities between different SES groups emerged as a pivotal factor influencing academic outcomes during the pandemic. As digital learning became the norm, access to reliable internet and essential technological tools was critical. The "digital divide" a pre-existing concern, became a chasm during the pandemic, with students from lower SES backgrounds often left on the disadvantaged side. This technological disparity echoes the findings of Castaño-Muñoz et al. (2020) and Mishra et al. (2021), emphasizing how limited access to essential digital resources can detrimentally impact academic engagement and outcomes.

The Impact of COVID-19 on Undergraduate Students'
Academic Performance at the University of Texas at
Arlington

Mohamed Abdalati

The importance of robust support systems, both academic and socio-emotional, has been underscored during the pandemic. As the data suggests, students with stronger support networks, typically from higher SES backgrounds, navigated the challenges of the pandemic more effectively. The finding that students from lower SES backgrounds often lacked these support structures is concerning, particularly given the heightened academic and personal challenges they faced. Institutions, moving forward, must recognize these disparities and work towards ensuring equitable support for all students, especially during crises. The observed increase in the average lab-only average for Nursing Microbiology students during the pandemic is intriguing. While this research posits that increased flexibility, especially for frontline healthcare worker students, might have played a role, further investigation is required. The nuances of specific courses and the unique challenges and supports available to students within them warrant closer scrutiny.

This research underscores the need for educational institutions to adopt a more holistic, student-centered approach, especially during disruptions. Recognizing the unique challenges faced by different student demographics, particularly those from lower SES backgrounds, is crucial. Institutions must proactively work towards bridging technological, academic, and socio-emotional support gaps to ensure equitable educational outcomes. Future research should delve deeper into understanding the long-term implications of the observed academic decline. Additionally, exploring the efficacy of the various digital tools and online pedagogies employed during the pandemic can offer insights into refining online education further. Lastly, understanding the psychological impacts of the pandemic on students, beyond just academic outcomes, is crucial. Such holistic understanding can guide institutions in fostering resilient, adaptable, and well-supported student communities, ready to navigate future challenges. The COVID-19 pandemic, while disruptive, offers valuable lessons for educational institutions. Recognizing disparities, understanding challenges, and proactively working towards inclusive, equitable education must be the way forward.
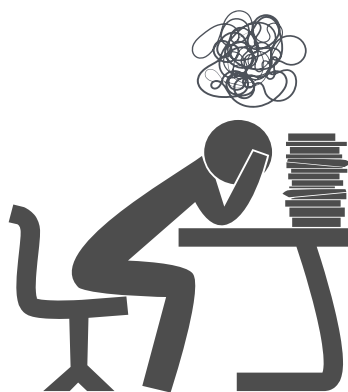
The Impact of COVID-19 on Undergraduate Students'
Academic Performance at the University of Texas at
Arlington

Mohamed Abdalati

Conclusion

 The COVID-19 pandemic, with its widespread repercussions, has significantly disrupted higher education, casting profound implications for students, educators, and institutions globally. Our research at UTA, specifically analyzing the academic trajectory of microbiology undergraduate students, provides compelling findings of this disruption. A salient finding from our study is the undeniable decline in academic performance, with the spring semesters of 2020 and 2021 bearing the brunt of this downturn. This trend of "learning loss" during the pandemic aligns with global observations and underscores the profound challenges introduced by the rapid transition to online learning environments. Disciplines like Microbiology, which rely heavily on hands-on, practical components, were particularly disadvantaged by the limitations of remote learning, with laboratory components and practical training sessions being notably affected.

 The educational shift was not just about navigating online platforms but grappling with the altered dynamics of student-teacher interactions, the challenges of self-motivation in isolated environments, and the often-impersonal nature of digital learning. For many students, the essence of collegiate learning—collaborative study sessions, real-time discussions, and on-campus resources—was markedly absent. This not only impacted their academic scores but also reshaped their entire educational experience. While the overarching theme was one of academic decline, nuances emerged when factors such as SES were considered. SES, an ever-present factor in educational outcomes, manifested more prominently during the pandemic. Students from lower SES backgrounds faced compounded challenges, not just from the pedagogical shifts but also from exacerbated technological disparities. The digital divide was more than a peripheral issue; it was a stark reality for many, further deepening the chasm of educational inequities.

The Impact of COVID-19 on Undergraduate Students'
Academic Performance at the University of Texas at
Arlington

Mohamed Abdalati

Works Cited

Al Lily, A. E., Ismail, A. F., Abunasser, F. M., & Alqahtani, R. H. A. (2020). Distance education as a response to pandemics: Coronavirus and Arab culture. Technology in Society, 63, 101317.

Arias, Meghan. Examining the digital disability divide in higher education. Diss. George Mason University, 2019.

Bulman, G., & Fairlie, R. (2022). The impact of COVID-19 on community college enrollment and student success: Evidence from California administrative data. National Bureau of Economic Research, 17(4), 745–764.

Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zheng, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. Psychiatry Research, 287, 112934.

Catalano, A. J., Torff, B., & Anderson, K. S. (2021). Transitioning to online learning during the COVID-19 pandemic: Differences in access and participation among students in disadvantaged school districts. International Journal of Information and Learning Technology, 38(2), 258–270.

Pearse, C., & Scott, S. (2023). A review of clinical laboratory education, training and progression: Historical challenges, the impact of covid-19 and future considerations. British Journal of Biomedical Science, 80, 12.

Restini, C., et al. (2023). Impact of COVID-19 on medical education: A narrative review of reports from selected countries. Journal of Medical Education and Curricular Development, 10.

Shin, H., Kim, J. S., & Lee, H. (2023). Association of depression with precautionary behavior compliance, COVID-19 fear, and health behaviors in South Korea: National cross-sectional study. JMIR Public Health and Surveillance, 9(1), e42677. https://doi.org/10.2196/42677

UNESCO. (2020). COVID-19 educational disruption and response.

Villatoro, A. P., Errisuriz, V. L., & DuPont-Reyes, M. J. (2023). Mental health needs and services utilization among undergraduate and graduate students in texas during the COVID-19 pandemic. International Journal of Environmental Research and Public Health, 20(12), 6066.

Whitmire, R. (2020, December 10). New data: College enrollment for low-income high school grads plunged by 29% during the pandemic. The 74 Million.

Yang, L, Wang, A., Wu, Y., Han, N., Huang, H. (2021). Impact of the COVID-19 pandemic on the mental health of college students: A systematic review and meta-analysis. *Frontiers in Psychology*.

Further Resources

Al Mamun, A., Hossain, A., Salehin, S., Khan, S. H., & Hasan, M. (2022). Engineering students' readiness for online learning amidst the COVID-19 pandemic. Educational Technology & Society, 25(3), 30–45.

Alqahtani, A., & Omira, A. (2022). Online distance learning during the COVID-19 lockdown in Saudi Arabia: Challenges and learning framework. The International Journal of Technologies in Learning, 30(1).

Alzahrani, L., & Seth, K. P. (2021). Factors influencing students' satisfaction with continuous use of learning management systems during the COVID-19 pandemic: An empirical study. Education and Information Technologies, 1–19.

The Impact of COVID-19 on Undergraduate Students'
Academic Performance at the University of Texas at
Arlington   Mohamed Abdalati

Beeson, E., Aideyan, B., O'Shoney, C., Bowes, D. A., Ansell, K. L., & Peterson, H. M. (2019). Predicting sense of community among graduate students in a distance learning environment. Universal Journal of Educational Research, 7(3), 746–753.

Byukusenge, C., Nsanganwimana, F., & Tarmo, A. P. (2022). Effectiveness of virtual laboratories in teaching and learning biology: A review of literature. Interna-tional Journal of Learning, Teaching and Educational Research, 21(6), 1–17.

García, E., & Weiss, E. (2020). COVID-19 and student performance, equity, and US education policy: Lessons from pre-pandemic research to inform relief, recovery, and rebuilding. Economic Policy Institute.

Huckins, J. F., DaSilva, A. W., Wang, W., Hedlund, E., Rogers, C., Nepal, S. K., … & Campbell, A. T. (2020). Mental health and behavior of college students during the early phases of the COVID-19 pandemic: Longitu-dinal smartphone and ecological momentary assessment study. https://doi.org/10.2196/20185

Kahu, E. R. (2013). Framing student engagement in higher education. Studies in Higher Education, 38(5), 758–773. https://doi.org/10.1080/03075079.2011.598505

Kumar, P., Kumar, P., Garg, R. K., Panwar, M., & Aggarwal, V. (2023). A study on teachers' perception towards E-learning adoption in higher educational institutions in India during the COVID-19 pandemic. Higher Education, Skills and Work-based Learning, 13, 4720–4738.

Li, C., et al. (2023). Factors affecting academic performance of college students in China during COVID-19 pandemic: A cross-sectional analysis. Frontiers in Psychology, 14.

Lin, C. L., Jin, Y. Q., Zhao, Q., Yu, S. W., & Su, Y. S. (2021). Factors influence students' switching behavior to online learning under COVID-19 pandemic: A push–pull–mooring model perspective. The Asia-Pacific Education Researcher, 30.

Mogaji, E. (2020). Financial vulnerability during a pandemic: Insights for coronavirus disease (COVID-19). 57–63. https://papers.ssrn.com/sol3/papers.cfm?abstract_id = 3564702.

Odriozola-González, P., Planchuelo-Gómez, Á., Irurtia, M. J., & de Luis-García, R. (2020). Psychological ef-fects of the COVID-19 outbreak and lockdown among students and workers of a Spanish university. Psychia-try Research, 290, 113108.

Raghunathan, S., Singh, A. D., & Sharma, B. (2021). Study of resilience in learning environ-ments during the covid-19 pandemic. Frontiers in Education.

Richardson, J. C., Arbaugh, J. B., Cleveland-Innes, M., Ice, P., Swan, K. P., & Garrison, D. R. (2012). Using the community of inquiry framework to inform effective instructional design. The Next Generation of Distance Education: Unconstrained Learning, 97–125.

Stuckey-Mickell, T. A., & Stuckey-Danner, B. D. (2007). Virtual labs in the online biology course: Student perceptions of effectiveness and usability. MERLOT journal of online learning and teaching, 3(2), 105–111.

Whitmire, R. (2020, December 10). New data: College enrollment for low-income high school grads plunged by 29% during the pandemic. The 74 Million.

Ziauddeen, N., Woods-Townsend, K., Saxena, S., Gilbert, R., & Alwan, N. A. (2020). Schools and COVID-19: Reopening Pandora's box?. Public Health in Practice, 1, 100039.