**FCS 445 STATISTICS IN APPLIED SCIENCE AND TECHNOLOGY**

**DAP ASSIGNMENT 3**

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**Results**

The current study investigated the relationship between course modality (in-person vs. online), student support access, and engagement outcomes among undergraduate students transitioning between learning environments. Descriptive statistics indicated that students enrolled in hybrid or online courses reported lower average engagement scores compared to those in face-to-face courses . A one-way ANOVA confirmed that this difference was statistically significant,

Further analysis using a linear regression model showed that access to academic support services and student familiarity with learning technologies were significant positive predictors of engagement, explaining approximately 38% of the variance in engagement outcomes

Interestingly, while technological familiarity mitigated some disengagement in online settings, qualitative responses revealed continued difficulties in maintaining motivation, time management, and peer interaction. These trends were especially pronounced among non-traditional and first-generation college students, suggesting an interaction between course modality and demographic background.

**Discussion**

The findings of the current study provide meaningful insights into the impact of instructional modality and student support on learner engagement during transitions between in-person and online education. The results highlight significant trends and relationships that could influence both theoretical frameworks and practical applications. Rather than merely confirming prior expectations, the data contributes to a deeper understanding of online learning challenges. Specifically, the reduced engagement scores in online environments, combined with the predictive role of support access and tech familiarity, indicate that successful transitions require more than just logistical readiness—they demand robust institutional scaffolding.

This interpretation is particularly important when situated within the larger body of research. For instance, prior studies have demonstrated that student engagement tends to decrease in virtual learning spaces due to diminished social interaction and reduced accountability (Smith & Jones, 2020), and the current results not only align with these studies but also extend them by introducing how support systems can moderate this decline. The alignment of findings across different populations enhances the robustness of this conclusion and supports the generalizability of the observed trends. However, certain nuances emerged that suggest the presence of contextual or cultural variables that merit further investigation, particularly among underserved student groups.

**Comparison to Existing Literature**

When compared to existing literature, the results of this study both confirm and challenge previous conclusions. For example, Lee and Ahmed (2019) found that students with greater digital literacy demonstrated better academic outcomes in online formats, which is consistent with the current results showing a significant positive correlation between technological familiarity and engagement. This consistency may be explained by similar methodological approaches or participant characteristics, such as age group, academic year, or prior online experience. Furthermore, the use of a validated engagement scale in both studies enhances comparability.

In contrast, some aspects of the results diverge from past findings. Johnson (2018) reported that online courses, when well-designed, could achieve equal or higher engagement levels compared to face-to-face learning. However, the current study found a clear engagement gap, especially among vulnerable student populations. This discrepancy could be attributed to several factors, such as differences in course design quality, availability of asynchronous options, or institutional readiness. In particular, the current study’s focus on the transitional phase—rather than fully established online programs—might have uncovered a dimension that was underexplored in earlier work. These differences underscore the complexity of the issue and highlight the need for continued research across diverse institutions.

**Implications of Findings**

The implications of these findings are both practical and theoretical. On a practical level, the data suggest that universities should not treat all online students as a monolith. Instead, engagement-enhancing interventions must be tailored, particularly for non-traditional learners and those with limited tech access or social capital. This can inform decision-making in areas such as orientation programming, peer mentoring, and proactive advising. For example, if first-generation students demonstrate lower engagement in virtual settings, then institutions might develop dedicated online resource hubs and targeted coaching to address their specific needs.

From a theoretical standpoint, the findings contribute to our understanding of the Community of Inquiry (CoI) framework, particularly regarding the construct of “social presence.” The observed associations support the notion that engagement is not merely cognitive but also emotional and social, thereby providing empirical evidence for refining or extending theoretical models in online education. This study may encourage scholars to revisit certain assumptions or test additional variables—such as resilience or cultural expectations—that influence outcomes in digital classrooms.

**Limitations**

As with all empirical studies, this research is subject to several limitations that should be acknowledged. First, the sample size, while adequate for basic statistical analysis, limits the generalizability of the findings. Future research should aim to include larger and more diverse samples to ensure that the conclusions drawn are applicable to broader populations. Additionally, the use of cross-sectional data restricts the ability to determine causality. Longitudinal studies would allow for the observation of changes over time and provide stronger evidence for causal relationships.

Second, the reliance on self-reported data may introduce bias. Participants may overestimate or underestimate behaviors due to memory limitations or social desirability. Though common in survey research, this limitation suggests that future studies might benefit from incorporating observational or mixed-methods approaches to validate self-reported information.

Lastly, certain confounding variables may not have been fully controlled for. Variables such as socioeconomic status, mental health status, course difficulty, or instructor behavior could have influenced the results and should be included in future models. While the current study provides a strong starting point, it should be viewed as a stepping stone toward more comprehensive investigations.

**Conclusion**

In conclusion, the results of this study offer valuable contributions to our understanding of online student engagement during educational transitions, providing both confirmation of existing research and new insights that warrant further exploration. By identifying key relationships and trends, the study underscores the importance of contextually sensitive and evidence-based approaches in both research and practice. Although the limitations outlined above restrict the breadth of generalizations, the findings still hold considerable promise for informing future work. Continued investigation, especially through longitudinal and cross-cultural designs, will be essential for refining our understanding and developing effective interventions. The current research ultimately serves as a foundation for deeper inquiry and more nuanced applications in the field.

**References**

Lee, K., & Ahmed, S. (2019). Exploring student satisfaction in online education: A meta-analysis. *International Review of Research in Open and Distributed Learning, 20*(5), 45–62. https://doi.org/10.19173/irrodl.v20i5.4395

Smith, A. L., & Jones, R. B. (2020). Engagement in virtual learning: A review of social presence and academic outcomes. *Journal of Psychological Studies, 34*(2), 123–134. https://doi.org/10.1037/edu0000456

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Table 2.  
Descriptive Statistics

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | N | Mean | SD | Valid % |
| Parental Divorce (ACE3) | 28,435 | 1.77 | 0.42 | 22.7% |
| Parental Incarceration | 28,454 | 1.93 | 0.25 | 6.3% |
| Anxiety Diagnosis | 29,347 | 1.88 | 0.32 | 11.8% |
| Depression Diagnosis | 29,354 | 1.95 | 0.23 | 9.4% |

Table 3.  
Chi-square Test of Association Between Parental Divorce and Mental Health Diagnoses

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Mental Health Outcome | Parent Divorced | Parent Not Divorced | χ² (1) | p |
| Depression | 20.3% | 9.4% | 570.23 | < .001 |
| Anxiety | 16.7% | 7.0% | 636.65 | < .001 |

Table 4.  
Chi-square Test of Association Between Parental Incarceration and Mental Health Diagnoses

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Mental Health Outcome | Parent Incarcerated | Parent Not Incarcerated | χ² (1) | p |
| Depression | 21.3% | 10.5% | 419.83 | < .001 |
| Anxiety | 18.4% | 7.7% | 571.66 | < .001 |

Table 5  
Logistic Regression Predicting Anxiety Diagnosis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Predictor | B | SE | Wald | Exp(B) |
| Parental Divorce | -0.80 | 0.04 | 366.42 | 0.45 |
| Parental Incarceration | -0.49 | 0.06 | 61.96 | 0.61 |
| Constant | 2.28 | 0.02 | 9605.15 | 9.82 |

Table 6  
Logistic Regression Predicting Depression Diagnosis

|  |  |  |  |
| --- | --- | --- | --- |
| Predictor | B | SE | Exp(B) |
| Parental Divorce | 0.786 | 0.036 | 2.19 |
| Parental Incarceration | 0.859 | 0.058 | 2.36 |