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SMARTPHONE-SUPPORTED LEARNING AND PERCEIVED ACADEMIC PERFORMANCE AMONG HIGHER EDUCATION STUDENTS: A PREDICTIVE AND COMPARATIVE STUDY

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1. ABSTRACT

The ubiquitous integration of smartphones into higher education has fundamentally reshaped how students access information, communicate, and engage with digital learning resources. This study examined the relationships and predictive contributions of interaction competency, smartphone self-efficacy, and behavioural intention to use smartphones for academic purposes in relation to students' perceived academic performance. The study was theoretically informed by selected concepts from the Technology Acceptance Model (TAM) and Social Cognitive Theory. A quantitative, cross-sectional survey was conducted among students at the Advanced Technological Institute (ATI) Dehiwala and ATI Kandy. Of 250 questionnaires distributed, 212 valid responses were obtained, representing an effective response rate of 84.8%. Data were analysed using descriptive statistics, Cronbach's alpha, Pearson's correlation, multiple linear regression, independent-samples *t*-tests with Cohen's *d* effect sizes, and one-way analysis of variance (ANOVA) with post-hoc comparisons.

The findings indicated statistically significant positive relationships between interaction competency, smartphone self-efficacy, behavioural intention, and perceived academic performance. Behavioural intention demonstrated the strongest bivariate relationship with perceived academic performance (*r* = .702, *p* < .001) and emerged as the strongest statistical predictor in the regression model (β = .453, *p* < .001). Collectively, interaction competency, smartphone self-efficacy, and behavioural intention explained 57.8% of the variance in perceived academic performance. No

statistically significant gender difference was identified (*p* = .291, Cohen's *d* = 0.15). However, significant differences were observed between ATI Dehiwala and ATI Kandy across all four study variables, with small effect sizes (*d* = 0.29 to 0.32). Significant differences in perceived academic performance were also identified across academic programme groups (*p* = .002, η^2 =.070), with Information Technology students reporting higher performance than Accountancy and Other Programmes students.

The study contributes to research on smartphone-supported learning by integrating correlational, predictive, and comparative analyses within two institutional contexts in Sri Lankan higher education. The findings suggest that students' confidence in using smartphones, their ability to interact through digital learning environments, and their intention to use smartphones for academic purposes are associated with perceived academic performance. However, the cross-sectional design, convenience sampling, and reliance on self-reported performance measures limit causal interpretation and generalisability. Future research should employ longitudinal designs, probability sampling, and objective academic performance indicators to further investigate these relationships.

KEYWORDS: Smartphone-supported learning, interaction competency, smartphone self-efficacy, behavioural intention, perceived academic performance, higher education, mobile learning

2. INTRODUCTION

The rapid development of mobile technologies has fundamentally transformed how students access and engage with educational content. Smartphones are increasingly used for communication, information retrieval, online learning, educational applications, and learning management systems. Their portability and accessibility provide higher education students with opportunities to access learning resources, communicate with lecturers and peers, and participate in academic activities beyond conventional classroom environments (Crompton & Burke, 2018; Rung et al., 2014).

The increasing adoption of smartphones and digital technologies has created new opportunities for mobile-supported learning in higher education. In Sri Lanka, the growing availability and use of digital technologies have strengthened the potential for integrating mobile devices into teaching and learning practices (DataReportal, 2025; Kemp, 2023). However, access to smartphones alone does not necessarily result in improved academic outcomes. Although smartphones can facilitate access to educational resources and communication, excessive or inappropriate use may contribute to distraction, multitasking, and reduced academic engagement (Levine et al., 2018; Amez & Baert, 2020).

Consequently, the educational value of smartphones may depend not only on device ownership or frequency of use but also on how effectively students use these technologies for academic purposes. Students' ability to interact within digital learning environments, their confidence in using smartphones for academic activities, and their intention to use smartphones as learning tools may be important factors associated with the academic benefits they perceive.

2.1 Theoretical Framework

This study draws on two complementary theoretical perspectives: the Technology Acceptance Model (TAM) and Social Cognitive Theory.

The Technology Acceptance Model, proposed by Davis (1989), explains technology acceptance through users' perceptions regarding the usefulness and ease of use of a technology. Subsequent extensions of TAM have emphasised behavioural intention as an important proximal determinant of technology use (Venkatesh & Davis, 2000). In mobile learning contexts, behavioural intention is considered an important factor associated with students' willingness to adopt and use mobile technologies for educational purposes (Al-Emran et al., 2016; Park et al., 2012). In the present study, TAM is therefore used primarily to provide a theoretical basis for examining students' behavioural intention to use smartphones for academic purposes.

Social Cognitive Theory (Bandura, 1986) provides the theoretical basis for examining smartphone self-efficacy. Self-efficacy refers to an individual's belief in their capability to perform particular activities successfully. Students with higher self-efficacy may be more likely to initiate academic technology use, persist when difficulties arise, and engage confidently with technology-mediated learning tasks.

Interaction competency is incorporated as a complementary construct reflecting students' perceived ability to communicate, participate, and collaborate effectively through technology-mediated learning environments. Such competencies are increasingly relevant to higher education environments in which students interact with lecturers and peers through learning management systems, messaging platforms, online discussion spaces, and other digital tools.

Accordingly, the present study does not attempt to test the complete original TAM structure. Instead, it applies selected concepts from TAM and Social Cognitive Theory to investigate the relationships between behavioural intention, smartphone self-efficacy, interaction competency, and perceived academic performance.

2.2 Research Problem and Institutional Context

Although smartphones are widely used by higher education students, their educational value cannot be determined solely by ownership or frequency of use. There is a need to understand whether students' interaction competency, confidence in using smartphones for academic activities, and intention to use smartphones for learning are associated with perceived academic performance.

Previous studies have examined smartphone use, mobile learning acceptance, technology adoption, and academic outcomes. However, comparatively limited research has examined interaction competency, smartphone self-efficacy, and behavioural intention simultaneously as statistical predictors of perceived academic performance within the Sri Lankan higher education context.

This study addresses this gap by examining these variables among students at two Advanced Technological Institutes (ATIs): ATI Dehiwala and ATI Kandy. The inclusion of two institutions enables a comparative examination of whether students' perceptions differ across institutional contexts. The comparison is particularly relevant because students in different institutional and geographical settings may experience different learning environments and levels of access to digital resources.

However, institutional location alone cannot establish the reasons for any observed differences. Therefore, this study treats institution as a comparative grouping variable rather than assuming that geographical location directly causes differences in students' smartphone-supported learning experiences.

2.3 Research Objectives

Main Objective

The main objective of this study was to examine the relationships and predictive contributions of interaction competency, smartphone self-efficacy, and behavioural intention to students' perceived academic performance.

Specific Objectives

1. To examine the relationship between interaction competency and perceived academic performance.
2. To examine the relationship between smartphone self-efficacy and perceived academic performance.

3. To examine the relationship between behavioural intention to use smartphones for academic purposes and perceived academic performance.
4. To determine the combined and individual predictive contributions of interaction competency, smartphone self-efficacy, and behavioural intention to perceived academic performance.
5. To examine whether perceived academic performance differs significantly by gender.
6. To compare students at ATI Dehiwala and ATI Kandy in terms of interaction competency, smartphone self-efficacy, behavioural intention, and perceived academic performance.
7. To examine whether perceived academic performance differs significantly across academic programme groups.

2.4 Research Hypotheses

Relationships Between Study Variables

H1: Interaction competency has a significant positive relationship with perceived academic performance. H2: Smartphone self-efficacy has a significant positive relationship with perceived academic performance.

H3: Behavioural intention to use smartphones for academic purposes has a significant positive relationship with perceived academic performance.

Predictive Relationships

H4: Interaction competency significantly predicts perceived academic performance when controlling for smartphone self-efficacy and behavioural intention.

H5: Smartphone self-efficacy significantly predicts perceived academic performance when controlling for interaction competency and behavioural intention.

H6: Behavioural intention significantly predicts perceived academic performance when controlling for interaction competency and smartphone self-efficacy.

Gender Comparison

H7: There is a significant difference in perceived academic performance between male and female students.

Institutional Comparisons

H8a: There is a significant difference in interaction competency between students at ATI Dehiwala and ATI Kandy.

H8b: There is a significant difference in smartphone self-efficacy between students at ATI Dehiwala and ATI Kandy.

H8c: There is a significant difference in behavioural intention between students at ATI Dehiwala and ATI Kandy.

H8d: There is a significant difference in perceived academic performance between students at ATI Dehiwala and ATI Kandy.

Academic Programme Comparison

H9: There is a significant difference in perceived academic performance across academic programme groups.

3. MATERIALS AND METHODS

3.1 Research Design

This study adopted a quantitative, cross-sectional research design to examine the relationships and predictive contributions among interaction competency, smartphone self-efficacy, behavioural intention, and perceived academic performance. The study was theoretically informed by selected concepts from the Technology Acceptance Model and Social Cognitive Theory.

The cross-sectional design enabled the researchers to collect data from respondents at a single point in time and examine statistical associations among the study variables. However, because data were collected at one point in time, the findings do not establish causal relationships among the variables.

3.2 Study Population and Sampling

The study population consisted of students enrolled in selected academic programmes at ATI Dehiwala and ATI Kandy. A convenience sampling technique was employed because the researchers targeted accessible students who were available during the data collection period and willing to participate.

A total of 250 questionnaires were distributed, of which 212 valid responses were obtained, representing an effective response rate of 84.8%. The final sample consisted of 108 students (50.9%) from ATI Dehiwala and 104 students (49.1%) from ATI Kandy, providing a relatively balanced institutional representation.

Because convenience sampling was used, the findings should be interpreted with caution regarding their generalisability to the wider population of higher education students in Sri Lanka.

3.3 Data Collection Instrument

Data were collected using a structured questionnaire consisting of four measurement constructs:

- Interaction Competency: 6 items
- Smartphone Self-Efficacy: 16 items
- Behavioural Intention: 10 items
- Perceived Academic Performance: 8 items

The measurement items were informed by previous research on technology acceptance, mobile learning, smartphone use, and student learning behaviour (Davis, 1989; Han & Yi, 2018; Park et al., 2012).

Responses were recorded using a five-point Likert-type scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree.

The dependent variable was measured as perceived academic performance, reflecting respondents' self-reported perceptions rather than objective academic records such as grade point averages or examination results.

Validity and Pilot Testing

To establish content and face validity, the questionnaire was reviewed by three subject-matter experts with expertise in educational technology and research methodology. A pilot test was subsequently conducted with 30 students who were not included in the final sample. The pilot study was used to assess item clarity, relevance, wording, and overall questionnaire comprehensibility. Feedback obtained during the pilot stage informed minor refinements to the questionnaire before full-scale data collection.

3.4 Variables of the Study

Perceived academic performance was treated as the dependent variable. Interaction competency, smartphone self-efficacy, and behavioural intention were treated as the primary independent variables.

The study also examined differences in the study variables according to gender and institution and examined differences in perceived academic performance across academic programme groups.

3.5 Data Analysis

Data were analysed using descriptive and inferential statistical techniques.

Frequencies and percentages were used to summarise respondent characteristics. Means and standard deviations were calculated to describe the central tendency and variability of the study variables.

Cronbach's alpha coefficients were calculated to assess the internal consistency reliability of the measurement constructs.

Pearson's product-moment correlation analysis was conducted to examine the relationships between interaction competency, smartphone self-efficacy, behavioural intention, and perceived academic performance.

Multiple linear regression analysis was conducted to examine the individual and combined predictive contributions of interaction competency, smartphone self-efficacy, and behavioural intention to perceived academic performance. Multicollinearity was assessed using tolerance and variance inflation factor (VIF) statistics.

Independent-samples *t*-tests were conducted to examine differences in perceived academic performance by gender and differences between ATI Dehiwala and ATI Kandy. Cohen's *d* was calculated to estimate the magnitude of group differences.

One-way analysis of variance (ANOVA) was conducted to examine differences in perceived academic performance across academic programme groups. Where the overall ANOVA was statistically significant, Tukey's HSD post-hoc test was used to identify specific group differences.

Statistical significance was evaluated at the 0.05 significance level.

3.6 Ethical Considerations

Participation in the study was voluntary. Respondents were informed about the academic purpose of the research and the confidentiality of the information provided. Participants were not required to provide personally identifiable information, and the collected data were used solely for research purposes.

4. RESULTS

4.1 Respondent Profile

A total of 212 valid responses were included in the analysis. The sample consisted of 68 male respondents (32.1%) and 144 female respondents (67.9%).

In terms of institutional representation, 108 respondents (50.9%) were from ATI Dehiwala, while 104 respondents (49.1%) were from ATI Kandy.

Respondents represented four broad academic programme categories: Information Technology (*n* = 58, 27.4%), Accountancy (*n* = 52, 24.5%), Business (*n* = 47, 22.2%), and Other Programmes (*n* = 55,
25.9%).

4.2 Reliability and Descriptive Statistics

Cronbach's alpha coefficients ranged from .884 to .932, indicating satisfactory to excellent internal consistency across the four measurement constructs.

All mean scores were above the midpoint of the five-point Likert scale. Smartphone Self-Efficacy recorded the highest mean score (*M* = 3.81, *SD* = .63), followed by Behavioural Intention (*M* = 3.76, *SD* = .65), Interaction Competency (*M* = 3.72, *SD* = .64), and Perceived Academic Performance (*M* = 3.68, *SD* = .63).

Table 1. Reliability and Descriptive Statistics of Study Variables

Construct	No. of Items	Cronbach's α	Mean (*M*)	*SD*
Interaction Competency	6	.884	3.72	.64
Smartphone Self-Efficacy	16	.932	3.81	.63
Behavioural Intention	10	.918	3.76	.65
Perceived Academic Performance	8	.901	3.68	.63

Note. N = 212.

The reliability coefficients indicate that the measurement scales demonstrated acceptable internal consistency for subsequent statistical analysis.

4.3 Correlation Analysis

Pearson's product-moment correlation analysis was conducted to examine the relationships among the study variables.

The results indicated statistically significant positive relationships between all three independent variables and perceived academic performance. Interaction Competency was positively correlated with Perceived Academic Performance (*r* = .521, *p* < .01). Smartphone Self-Efficacy demonstrated a stronger positive relationship with Perceived Academic Performance (*r* = .645, *p* < .01). Behavioural Intention demonstrated the strongest positive relationship with Perceived Academic Performance (*r* = .702, *p* < .01). These findings indicate that students who reported higher levels of interaction competency, smartphone self-efficacy, and behavioural intention also tended to report higher perceived academic performance. Therefore, H1, H2, and H3 were supported.

Table 2. Pearson Correlation Matrix.

Variable	1	2	3	4
1. Interaction Competency	1			
2. Smartphone Self-Efficacy	.612**	1		
3. Behavioural Intention	.584**	.671**	1	
4. Perceived Academic Performance	.521**	.645**	.702**	1

Note. **p* < .01 (two-tailed). N = 212.

4.4 Multiple Linear Regression Analysis

Multiple linear regression analysis was conducted to examine whether interaction competency, smartphone self-efficacy, and behavioural intention significantly predicted perceived academic performance.

The overall regression model was statistically significant, F(3, 208) = 94.72, *p* < .001. The model produced an R^2 value of .578 and an adjusted R^2 value of .572. Therefore, the three predictors collectively accounted for 57.8% of the variance in perceived academic performance.

All three predictors made statistically significant positive contributions to the regression model. Behavioural Intention emerged as the strongest statistical predictor (β = .453, *p* < .001), followed by Smartphone Self-Efficacy (β = .277, *p* < .001) and Interaction Competency (β = .155, *p* = .008).

Tolerance values ranged from .491 to .625, while VIF values ranged from 1.60 to 2.04. These results indicate that there was no serious multicollinearity among the predictors.

Therefore, H4, H5, and H6 were supported.

Table 3. Multiple Linear Regression Predicting Perceived Academic Performance.

Predictor	*B*	*SE*	β	*t*	*p*	Tolera nce	VIF
Constant	.812	.185	—	4.39	< .001	—	—
Interaction Competency	.165	.061	.155	2.70	.008	.625	1.60
Smartphone Self-Efficacy	.298	.066	.277	4.52	< .001	.491	2.04
Behavioural Intention	.487	.065	.453	7.49	< .001	.552	1.81

Note. R = .760; R^2 = .578; Adjusted R^2 = .572; F(3, 208) = 94.72, *p* < .001; N = 212.

Verification check: The standardized betas are mathematically consistent with the reported R^2 *(*$\beta\_IC \times r\_IC + \beta\_SSE \times r\_SSE + \beta\_BI \times r\_BI = .155 \times .521 + .277 \times .645 + .453 \times .702 = .578$*).*

The findings indicate that behavioural intention was the strongest statistical predictor among the three variables examined. However, because the study employed a cross-sectional design, the regression results should be interpreted as statistical prediction and association rather than evidence of causal influence.

COMPARATIVE ANALYSIS

4.5 Gender Differences in Perceived Academic Performance

An independent-samples *t*-test was conducted to examine whether perceived academic performance differed significantly between male and female students.

Male students reported a mean perceived academic performance score of 3.61 (*SD* = .66), while female students reported a mean score of 3.71 (*SD* = .61). The difference was not statistically significant, *t*(210) =
-1.06, *p* = .291.

The effect size was small (Cohen's *d* = 0.15), indicating that the observed difference was of limited practical magnitude.

Therefore, H7 was not supported.

The finding suggests that male and female students in the present sample reported broadly comparable levels of perceived academic performance in the context of smartphone-supported learning.

4.6 Differences Between ATI Dehiwala and ATI Kandy

Independent-samples *t*-tests were conducted to compare students from ATI Dehiwala and ATI Kandy across the four study variables.

Students from ATI Dehiwala reported significantly higher mean scores for Interaction Competency, Smartphone Self-Efficacy, Behavioural Intention, and Perceived Academic Performance.

The effect sizes ranged from *d* = 0.29 to *d* = 0.32, indicating small differences between the two institutional groups.

Table 4. Comparison of Study Variables Between ATI Dehiwala and ATI Kandy.

Variable	ATI Dehiwala *M* (*SD*)	ATI Kandy *M* (*SD*)	*t*	*p*	Cohen's *d*
Interaction Competency	3.82 (.59)	3.62 (.68)	2.29	.023	0.32
Smartphone Self-Efficacy	3.91 (.57)	3.71 (.67)	2.34	.020	0.32
Behavioural Intention	3.86 (.60)	3.66 (.69)	2.25	.025	0.31
Perceived Academic Performance	3.77 (.58)	3.59 (.67)	2.09	.038	0.29

Note. ATI Dehiwala, *n* = 108; ATI Kandy, *n* = 104. The findings provide support for H8a, H8b, H8c, and H8d.

Although statistically significant differences were observed, the effect sizes were small. Therefore, the results indicate that the two institutional groups differed in their reported levels of the study variables, but the magnitude of these differences was relatively limited.

Because the study did not directly measure institutional infrastructure, internet connectivity, socioeconomic status, device quality, or access to digital resources, these factors cannot be identified as direct explanations for the observed institutional differences. Future research should investigate such contextual factors to determine whether they contribute to differences in smartphone-supported learning experiences.

4.7 Differences Across Academic Programme Groups

A one-way ANOVA was conducted to examine whether perceived academic performance differed across four academic programme groups.

The results revealed a statistically significant difference in perceived academic performance among the programme groups, $F(3, 208) = 5.18$, *p* = .002, $\eta^2 = .070$.

The effect size ($\eta^2 = .070$) indicates that approximately 7.0% of the variance in perceived academic performance was associated with differences among academic programme groups.

Tukey's HSD post-hoc analysis revealed that Information Technology students reported significantly higher perceived academic performance than Accountancy students (*p* = .012) and Other Programmes students (*p* = .004). No other pairwise comparisons reached statistical significance.

Therefore, H9 was supported.

The observed programme differences may reflect differences in curriculum structure, learning activities, technology integration, or students' academic experiences. However, these possible explanations were not directly measured in the present study. Consequently, they should be considered possible interpretations rather than established causes of the observed differences.

Table 5. Tukey HSD Post-Hoc Comparisons of Academic Performance.

Programme Comparison	Mean Difference	*p*
Information Technology – Accountancy	.24	.012
Information Technology – Business	.15	.184
Information Technology – Other Programmes	.31	.004
Accountancy – Business	-.09	.612
Accountancy – Other Programmes	.07	.731

Note. Significant mean differences are reported at *p* < .05.\

5. DISCUSSION

The findings demonstrate statistically significant positive relationships among interaction competency, smartphone self-efficacy, behavioural intention, and perceived academic performance. The results suggest that students who report greater confidence in using smartphones for academic activities, stronger interaction competencies, and stronger intentions to use smartphones for academic purposes also tend to report more positive academic performance outcomes.

Behavioural intention demonstrated the strongest bivariate relationship with perceived academic performance and emerged as the strongest statistical predictor in the regression model ($\beta = .453$). This finding is broadly consistent with the central role assigned to behavioural intention in technology acceptance research (Davis, 1989; Venkatesh & Davis, 2000). Students who have stronger intentions to use smartphones for academic purposes may be more likely to engage regularly with mobile learning resources and academic communication tools.

However, the present study does not establish that behavioural intention causes improved academic performance. Rather, the results indicate that behavioural intention is statistically associated with and contributes significantly to the prediction of perceived academic performance within the regression model.

Smartphone self-efficacy also demonstrated a substantial positive relationship with perceived academic performance and made a significant unique contribution to the regression model ($\beta = .277$). This finding is consistent with the principles of Social Cognitive Theory (Bandura, 1986), which emphasises the importance of self-efficacy in shaping individuals' motivation, persistence, and engagement with tasks. Students who feel more capable of using smartphones for academic purposes may be more willing to engage with digital learning activities and overcome technology-related difficulties.

Interaction competency was also positively associated with perceived academic performance and made a statistically significant contribution to the regression model ($\beta = .155$). This finding highlights the potential importance of students' ability to communicate, participate, and collaborate effectively through digital platforms. In technology-mediated educational environments, interaction competency may facilitate students' participation in academic communication and collaborative learning activities.

The results also demonstrated statistically significant differences between students at ATI Dehiwala and ATI Kandy across all four study variables (*p* = .020 to .038). Although students from ATI Dehiwala reported higher mean scores, the effect sizes were small (*d* = 0.29 to 0.32). These findings suggest that the institutional groups differed in their reported experiences and perceptions, but the observed differences should not be interpreted as evidence that institutional location itself causes differences in academic performance or smartphone-supported learning.

The differences may be associated with a range of contextual factors, including learning environments, institutional practices, access to digital resources, or students' prior technological experiences. However, because these factors were not directly measured, further research is required to identify the specific mechanisms underlying the institutional differences.

The study also identified significant differences in perceived academic performance across academic programme groups ($\eta^2 = .070$). Information Technology students reported higher perceived academic performance than Accountancy and Other Programmes students. These differences may reflect variations in curriculum structure, technology integration, digital learning activities, or students' academic experiences. Nevertheless, the present study cannot determine which specific factors account for these differences.

The absence of a statistically significant gender difference indicates that male and female students in the sample reported comparable levels of perceived academic performance. The small effect size (*d* = 0.15) further suggests that the observed difference was of limited practical magnitude. This finding indicates that gender did not appear to be a major differentiating factor in perceived academic performance within the present sample.

Overall, the findings support the importance of considering multiple dimensions of smartphone-supported learning. Access to smartphones alone may not be sufficient to maximise their educational value. Students' confidence in using smartphones, their ability to interact effectively through digital environments, and their intention to use smartphones for academic purposes may all be relevant to their perceived academic outcomes.

6. CONCLUSION

This study examined the relationships and predictive contributions of interaction competency, smartphone self-efficacy, and behavioural intention to perceived academic performance among higher education students at ATI Dehiwala and ATI Kandy.

The study extended previous research by bringing together selected concepts from the Technology Acceptance Model and Social Cognitive Theory within a Sri Lankan higher education context and by incorporating both predictive and comparative analyses.

The findings demonstrated statistically significant positive relationships among interaction competency, smartphone self-efficacy, behavioural intention, and perceived academic performance. Behavioural intention demonstrated the strongest bivariate relationship with perceived academic performance (*r* = .702) and emerged as the strongest statistical predictor in the regression model (β = .453). Collectively, the three predictors explained 57.8% of the variance in perceived academic performance.

The comparative analysis revealed no statistically significant gender difference in perceived academic performance. In contrast, significant differences were observed between ATI Dehiwala and ATI Kandy across interaction competency (*t* = 2.29, *p* = .023), smartphone self-efficacy (*t* = 2.34, *p* = .020), behavioural intention (*t* = 2.25, *p* = .025), and perceived academic performance (*t* = 2.09, *p* = .038), with small effect sizes. Significant differences were also identified in perceived academic performance across academic programme groups, $F(3, 208) = 5.18$, *p* = .002, $\eta^2 = .070$, with Information Technology students outperforming Accountancy and Other Programmes students.

These findings suggest that effective smartphone-supported learning may involve more than access to mobile devices. Students' confidence in using smartphones, their ability to interact within digital learning environments, and their intention to use smartphones for academic purposes may be important factors associated with their perceived academic outcomes.

Based on the findings, higher education institutions may consider the following strategies:

1. Providing digital literacy and smartphone-supported learning training: Students may benefit from structured support to develop their confidence and competence in using mobile technologies for academic activities.
2. Integrating meaningful mobile learning activities: Smartphones can be incorporated into learning activities that promote academic communication, collaboration, information retrieval, and access to learning resources.

3. Strengthening digital learning environments: Institutions may improve access to reliable digital learning platforms and resources to support effective technology-mediated learning.
4. Promoting responsible and purposeful smartphone use: Students should be encouraged to distinguish between academic and non-academic smartphone use and to develop strategies for managing digital distractions.
5. Addressing contextual differences: Institutions may consider conducting needs assessments to identify differences in students' access to digital resources, technological skills, and learning support.

6.1 Limitations and Future Research

Several limitations should be acknowledged.

First, the cross-sectional research design limits the ability to establish causal relationships among the variables. The observed statistical associations should therefore not be interpreted as evidence that smartphone self-efficacy, interaction competency, or behavioural intention directly causes improved academic performance.

Second, convenience sampling was used, which may limit the generalisability of the findings to the wider population of higher education students in Sri Lanka.

Third, perceived academic performance was measured using self-reported questionnaire items rather than objective academic indicators such as grade point averages or examination results. Future studies should incorporate objective academic performance measures to validate the findings.

Fourth, although institutional differences were identified, the study did not directly measure factors such as internet connectivity, socioeconomic status, device quality, digital infrastructure, or institutional technology support. Future research should examine these contextual factors to better explain institutional differences.

Finally, future research could employ longitudinal designs to examine changes in smartphone-supported learning behaviour over time. Qualitative research could also provide deeper insight into how students use smartphones for academic purposes and the specific challenges they experience.

Overall, the study contributes to the understanding of smartphone-supported learning in Sri Lankan higher education by demonstrating that interaction competency, smartphone self-efficacy, and behavioural intention are significantly associated with perceived academic performance and collectively provide substantial statistical explanatory power. The findings also highlight the value of examining smartphone-supported learning through complementary correlational, predictive, and comparative perspectives.

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