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Exploring the Relationship Between Multitasking Intention (Based on the Theory of Planned Behavior) and Actual Multitasking Behavior of University Students: a Cross-Sectional Study at Hanoi University of Science and Technology

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Abstract

In the context of modern education, media multitasking behavior has become increasingly common and may be associated with lower levels of academic performance. The study aims to explore the relationship between multitasking intention - based on the Theory of Planned Behavior (TPB) - and actual multitasking behavior, measured using the Media Multitasking-Revised (MMT-R) scale at Hanoi University of Science and Technology. A quantitative research design was conducted with 257 students through an online survey administered over a period of one month. Reliability analyses and Pearson correlations were employed to examine the relationships among variables, followed by multiple linear regression to identify predictors of multitasking intention in the classroom. The results show that Attitude (AT) (β = 0.494) is the strongest predictor of intention, followed by Behavioral Beliefs (BB) (β = 0.269). At the same time, intention was strongly correlated with actual multitasking behaviors, including Compulsive Phone Checking (CPC, r = 0.583), Media Distraction (MD, r = 0.532), and the overall MMT-R scale (r = 0.614). These findings confirm the mediating role of intention in bridging cognition and behavior, and also suggest that sustaining long-term multitasking habits, whether active or passive, may linked to lower levels of self-regulation in classroom learning.

Keywords: Behavioral intention, media multitasking, media multitasking-revised scale(MMT-R),theory of planned behavior (TPB), university students.

1. Introduction

In today's university learning environment, engaging in multiple tasks during class time, particularly listening to lectures while simultaneously using technological devices for non-academic purposes (media multitasking), is becoming increasingly common and raises concerns about teaching and learning effectiveness. In practice, many students follow the lecture while at the same time engaging in unrelated activities such as accessing social media, texting, or handling personal matters.

Multitasking refers to the simultaneous performance of two tasks, or the rapid alternation between tasks, within brief intervals [1]. At least two types of media multitasking can be defined (1) using multiple media simultaneously and (2) using media while engaging in a non-media activity [2, 7-8]

Numerous studies have shown that multitasking in the classroom can cause and associated with various negative learning-related outcome. According to Ophir, Nass, and Wagner (2012) [3], multitasking may impair performance due to divided attention. Similarly, Junco and Cotten (2012) [12] found that simultaneously handling multiple tasks can reduce memory retention and logical reasoning abilities. While the integration of technology into teaching is being actively promoted by educational institutions, in practice, the improper use of technology in the classroom has been shown to associated with reduced concentration, comprehension, and academic outcomes. Educational technology is no longer limited to accessing lecture materials or taking online quizzes; it now encompasses a wide range of activities such as note sharing, watching instructional videos, or completing assignments on digital platforms-highlighting the growing prevalence of "mobile culture" in university settings [4]. This emerging mobile culture not only reflects changes in learning practices but also raises important questions about students' intentional engagement in media multitasking during lectures, which constitutes the central focus of the present study. Therefore, analyzing the impact of multitasking behavior in the context of modern education and proposing strategies to optimize such behavior has become a pressing task.

However, media multitasking in the classroom is a complex phenomenon that is influenced by contextual factors, cultural background, educational systems, and

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socio-economic conditions. In Vietnam, this issue has gained increasing attention; however, existing research has primarily focused on examining the psychological and health-related impacts of media multitasking, such as nomophobia, anxiety, and sleep quality among university students [5]. Very few studies have explored media multitasking as a behavioral intention grounded in a theoretical framework, and even fewer have attempted to explain why students choose to multitask during lectures. However, in Vietnam, empirical research explaining university students' intention to multitask in classroom settings remains limited.

This gap suggests several unresolved questions:

- What motivates students to engage in multitasking in the classroom?;

- Which contextual and psychological factors influence their intention to multitask?;

- To what extent does multitasking intention translate into actual multitasking behavior?.

Furthermore, previous research in Vietnam has not applied the Theory of Planned Behavior (TPB) to analyze students' multitasking intentions, nor has it incorporated standardized measures such as the Media Multitasking-Revised (MMT-R) scale to quantify actual multitasking behavior. As a result, there remains limited evidence on how intention relates to behavior in this context.

To address these gaps, the present study aims to:

(1) examine how TPB components influence students' intentions to engage in multitasking at a Vietnamese technical university; and

(2) analyze the relationship between multitasking intention and actual multitasking behavior using a combination of the TPB framework and the MMT-R scale.

The findings of this study are expected to not only strengthen the theoretical foundation related to multitasking behavior in the context of Vietnamese higher education, but also offer practical implications by providing scientific evidence to support the development of educational policies and the design of pedagogical interventions tailored to students' needs.

2. Overview of the Research Problem

2.1. Multitasking and Media Multitasking Behavior in the Classroom

2.1.1. Multitasking and media multitasking

In cognitive psychology, multitasking refers to the process of performing multiple tasks within a short period of time. However, it is essentially a process of task switching, which is associated with reduced cognitive performance and increased errors due to the phenomenon of dual-task interference [1, 9]. In classroom settings, multitasking has been shown to associated with difficulties in information retention, course content comprehension, and active learning, negatively affecting both the individual and surrounding peers [10, 11].

Media multitasking (MMT) refers to students' use of digital media while engaging in academic activities such as listening to lectures, taking notes, or doing assignments-that is, performing media-related behaviors while pursuing non-media-related goals [2]. MMT can be either active or passive [4], and is often associated with difficulties in attention control, increased susceptibility to distractions, and negative effects on both academic performance and psychological well-being [3, 7]. In Vietnam, this phenomenon is becoming increasingly common, highlighting the need for in-depth research to better understand the relationship between tasks learning intentions and behaviors in the digital age. In Vietnam, multitasking in university classrooms has become increasingly common, alongside the widespread use of smartphones and high speed internet. However, empirical research in the local context remains limited in two key respects: (1) explaining how students develop the intention to multitask during class and (2) identifying the psychological factors that can predict such multitasking behavior. This gap highlights the need for more in-depth studies to clarify the mechanisms underlying students' multitasking intentions and behaviors in today's digital education context.

2.1.2. Multitasking behaviors

Multitasking behavior refers to an individual's ability to perform multiple tasks or activities simultaneously by dividing or alternately shifting attention between them. In classroom settings, multitasking is commonly understood as students engaging in activities that are not directly related to the lecture during class time. This behavioral structure consists of two core components: the division of attention across tasks and the ability to switch rapidly between [1]. Common behaviors include using digital devices to text, browse social media, engage in off-topic interactions with peers or instructors, or work on unrelated personal assignments during class. Research has shown that such behaviors disrupt the flow of attention and negatively impact information processing and academic performance, despite the fact that students often overestimate their ability to multitask effectively [12-14].

2.1.3. Media multitasking behavior in the classroom

Media multitasking refers to students' use of various forms of digital media, such as social networking platforms, online videos, or mobile applications, while engaging in academic activities. Common behaviors of MMT in the classroom include checking social media, watching entertainment videos, browsing the internet, playing games, or online

shopping during class time [16, 17]. Several factors are associated with this behavior, including unengaging course content, a lack of classroom control, students' positive attitudes toward technology, and the widespread availability of personal mobile devices [16, 18]. MMT not only impairs students' concentration and learning, but is also associated with indirect consequences such as sleep disturbances and lower academic performance [3, 15].

2.2. Predicting Factors Influencing Media Multitasking Behavior in the Classroom Based on the Theory of Planned Behavior

2.2.1. Application of the Theory of Planned Behavior to Media Multitasking in University Classrooms

The application of the TPB in this study not only provides a solid theoretical foundation for explaining media multitasking behavior in the classroom, but also contributes to developing pedagogical interventions that are better suited to the digital education context, thereby improving teaching and learning quality.

The TPB [6] posits that behavioral intention is influenced by three core components: attitude toward the behavior (AT), Subjective norms (SN), and Perceived Behavioral Control (PBC). TPB is widely regarded as an appropriate theoretical framework for explaining learning behaviors in contemporary educational contexts, particularly as learning environments are increasingly shaped by digital technologies. For Vietnamese university students, TPB is especially relevant because classroom multitasking behavior often results from both individual choice and contextual classroom influences. In many cases, students tend to proactively use personal digital devices to support their learning, while simultaneously being influenced by collective norms and the overall classroom climate. In contrast to many Western research samples, where individual autonomy and self directed learning are more strongly emphasized, Vietnamese classroom settings may place greater weight on communal dynamics and situational expectations. As a result, TPB provides a suitable theoretical lens for analyzing media multitasking behavior in Vietnamese university classrooms.

International studies have reported differing roles of TPB components in explaining in class technology use. For example, Chai *et al.* (2020) [22] found in a Chinese context that Attitude (AT) and Perceived Behavioral Control (PBC) were strong predictors of mobile phone use during class, whereas SN tended to exert an indirect influence through behavioral intention. In Vietnam, however, applications of TPB to the analysis of learning behaviors, particularly classroom multitasking, remain relatively limited. Recent domestic studies, such as Le Pham Hoai Phuong *et al.* (2020) [21], have only begun to integrate TPB with other frameworks, including the Technology Acceptance Model (TAM), to examine online learning behaviors during the pandemic period. This indicates a clear research gap in the application of TPB to explain media multitasking behavior in Vietnamese classroom settings.

2.2.2. Behavioral Beliefs and Control Beliefs in the Extended TPB Model

Conceptual foundations of Behavioral Beliefs (BB) and Control Beliefs (CB): Within the TPB framework, BB reflect individuals' expectations regarding the benefits or costs associated with performing a specific behavior. These beliefs form the basis of AT, as individuals evaluate whether the behavior is positive or negative. In parallel, CB refer to perceptions of facilitating conditions or barriers that may affect one's ability to perform the behavior. Unlike PBC, which is more generalized in nature, CB emphasize context specific factors such as device availability, instructor supervision, internet connectivity quality, and classroom regulations regarding device use.

Measurement role of BB and CB in the extended TPB model: In the extended TPB model adopted in this study, BB and CB are measured as distinct latent constructs to clarify the mechanisms underlying the formation of Attitude (AT) and PBC. Specifically, BB indicators assess the extent to which students believe that media multitasking provides benefits (e.g., supporting information search, improving task efficiency, reducing stress) or incurs costs (e.g., decreased concentration, impaired comprehension, negative effects on academic performance). Meanwhile, CB indicators are designed to capture students' perceptions of facilitating conditions or constraints on multitasking in the classroom, such as internet quality, the level of instructor control, and rules governing device use. Integrating BB and CB into the model enhances its explanatory power with respect to behavioral intention and elucidates the psychological processes through which students form decisions to engage in media multitasking in classroom environments.

Applying TPB in an extended form in this study not only provides a robust theoretical foundation for explaining media multitasking behavior but also offers a scientific basis for proposing pedagogical interventions that are better aligned with the digital education context in Vietnam, ultimately contributing to improvements in teaching and learning quality at the university level.

2.3. The MMT-R Model and the Combination of the MMT-TPB Framework to Predict Factors Influencing Media Multitasking Behavior in the Classroom

Building on Fig. 1 and Fig. 2, this study integrates the TPB framework with the MMT-R scale to link psychological determinants of media multitasking with observed classroom behavior. Specifically, we examine BB and CB as antecedents that help explain how students form attitude toward media multitasking and PBC. Within TPB, AT, SN, and PBC are expected to predict students' intention to multitask, which in turn

predicts behavior. To operationalize actual multitasking behavior, we employ the MMT-R as a standardized measure of media multitasking in classrooms, capturing two behavioral dimensions: Compulsive Phone Checking (CPC) and Media Distraction (MD), for example listening to lectures while simultaneously texting, searching for information, or watching videos. Accordingly, the integrated model serves two objectives: (1) to clarify how BB and CB contribute to the formation of AT and PBC, and how AT, SN, and PBC predict behavioral intention; and (2) to examine the association between behavioral intention and media multitasking behavior as measured by CPC and MD.

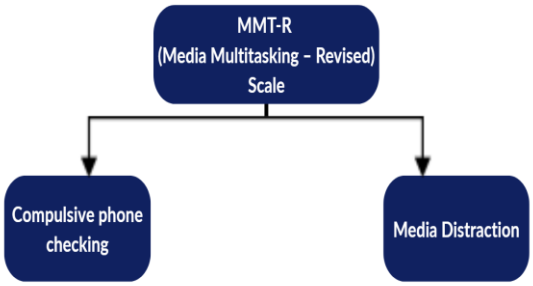

Fig. 1. Dimensions of the MMT R scale: CPC and Media Distraction

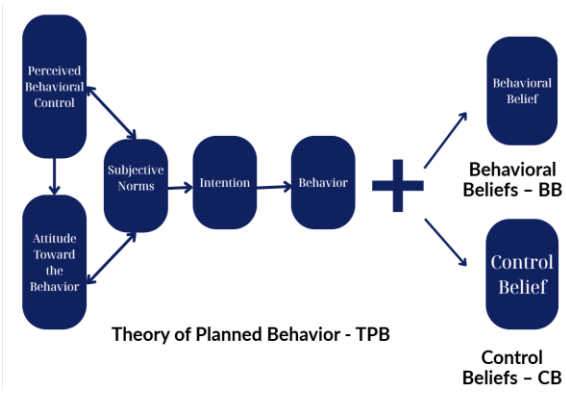

Fig. 2. Extended TPB framework incorporating Behavioral Beliefs and Control Beliefs for explaining intention and behavior in classroom media multitasking

3. Organization of the Research Methodology

3.1. Research Methods

This study uses a quantitative survey method to collect data from students at Hanoi University of Science and Technology. The data were collected using two main instruments: the MMT-R scale and a scale measuring students' intentions to engage in media multitasking in the classroom, which was developed based on the extended TPB proposed by Ajzen (2002) [19, 20].

The study employed the MMT-R scale, which consists of 18 items measuring media multitasking behavior with two main components: active behaviors (such as frequent phone checking) and passive distractions (such as interruptions caused by multimedia use). The scale uses a 5-point Likert format and demonstrates high reliability providing practical insights into the extent and habits of personal device use in learning. While the TPB primarily emphasizes cognitive and intentional factors, the MMT-R captures students' actual behaviors in the classroom, such as the frequency of device use or the extent of task switching. This 18-item version of the MMT-R is a shortened scale developed by [29], who validated its construct validity in the context of research on social information processing. The MMT-R scale was later applied and further validated by Lopez, Heatherton, and Wagner (2019), who examined the relationship between media multitasking behaviors and health-related outcomes, thereby confirming the reliability and applicability of the scale across different research contexts.

During the Cronbach's Alpha testing, both observed items of PBC (PBC1, PBC2) showed low reliability ($\alpha = 0.513$), which did not meet the acceptable threshold of 0.7; therefore, the PBC variable was excluded from the regression model. After additional reliability checks, the removal of PBC items did not improve overall scale reliability; therefore, PBC was excluded from the regression analysis. In contrast, the CB scale demonstrated high reliability ($\alpha = 0.822$), better reflecting the conditions of behavioral control and was retained for further analysis. For SN, although the initial Cronbach's Alpha was not ideal ($\alpha = 0.537$), the removal of the item with a low item–total correlation improved reliability, and thus SN was retained in the model.

Exploratory Factor Analysis (EFA) was conducted prior to regression analysis to examine the underlying factor structure of the MMT-R scale in the Vietnamese context. The EFA results supported the original two-factor structure of the scale, corresponding to active media multitasking behaviors and passive media-related distractions. All retained items exhibited satisfactory factor loadings, exceeding the commonly accepted threshold, and no substantial cross-loadings were observed. These results indicate that the MMT-R scale demonstrates adequate construct validity and is suitable for subsequent reliability testing and regression analysis in the present study.

The combination of the extended TPB scale with the MMT-R in this research not only helps illuminate the psychological factors that drive students' intentions to multitask with media but also enables an objective evaluation of how often and to what extent these behaviors actually occur in classroom settings. While TPB provides a theoretical framework to explain the formation of behavioral intentions through cognitive components such as attitude, SN, and perceived behavioral control, the MMT-R serves as an empirical

1clearer picture of how students use media in learning environments.

3.2. Research Procedure and Structure

The research procedure was implemented through seven sequential steps, which are summarized in Fig. 3 to enhance clarity and readability.

As illustrated in Fig. 3, the research procedure consisted of seven sequential steps, including reviewing relevant theories, selecting measurement scales, translating instruments, consulting experts, conducting a pilot test, removing unsuitable items, and implementing the main survey. This visual summary was used to enhance clarity and reduce lengthy procedural descriptions.

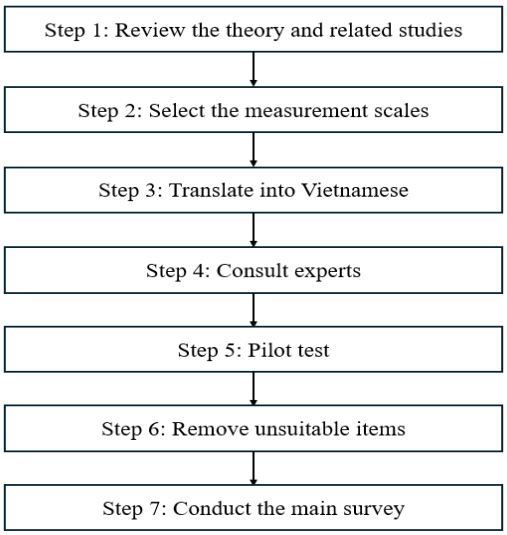

Fig. 3. Research procedure and structure of the study

We employed Microsoft Forms as the platform for administering the survey. At this stage, a convenience sampling approach was employed. Specifically, students were selected based on accessibility and voluntary participation through institutional email lists and student communication groups affiliated with Hanoi University of Science and Technology (HUST). After completing the questionnaire on this platform, we distributed the survey link via email and instant messaging through Outlook, Messenger, and Zalo. The target population of this study comprised undergraduate students currently enrolled at Hanoi University of Science and Technology (HUST). To ensure the authenticity and integrity of the data, only individuals and student groups affiliated with HUST received email or message invitations. The survey was closed once 314 responses were collected.

We then proceeded to the data-cleaning process. The criteria for data screening included the following: (1) responses exhibiting similar or repetitive patterns were removed; (2) responses with excessively short completion times were excluded; (3) responses containing illogical or inconsistent answers (i.e., answers that contradicted one another) were eliminated.

After data cleaning, a total of 257 responses were retained as valid and were subsequently used for further analysis.

Translation and Adaptation Procedure

To ensure linguistic accuracy and conceptual equivalence with the original scales, the research team employed a two-stage translation process consisting of forward translation and backward translation. In the forward translation stage, two bilingual members independently translated the original English items into Vietnamese. The research team then compared the two versions and reconciled them into a single finalized Vietnamese version.

Next, this reconciled version was back-translated into English by another team member who had no access to the original scale. The back-translated version was compared with the source instrument to identify semantic inconsistencies and adjust any discrepancies to fit the Vietnamese educational and cultural context. All revisions were finalized through internal discussion within the research team.

After completing the forward–backward translation and reconciliation process, the Vietnamese version of the scale was used in a pilot survey to assess clarity, comprehensibility, and the feasibility of the items before launching the main data collection.

3.3. Criteria for Statistical Tests

To ensure reliability and statistical significance in data analysis, this study applied several common standards, including Cronbach's Alpha, Pearson's correlation coefficient, and multiple linear regression. Specifically, Cronbach's Alpha was used to assess the reliability of the scale, with an acceptable threshold of 0.7 or higher [24]. In Pearson correlation analysis, the coefficient r was used to measure the strength and direction of the linear relationship between two quantitative variables. The value of r ranges from –1 to +1, where r greater than 0 indicates a positive relationship, r less than 0 indicates a negative relationship, and r equal 0 shows no linear relationship. A correlation is considered statistically significant if the Sig. value is less than 0.05 [25, 26].

Multiple linear regression analysis was conducted to identify the factors influencing students' intentions to engage in media multitasking. An F-test with a significance level of Sig. less than 0.05 and the comparison between the observed F-value and the critical F-value were used to confirm the reliability of the model. In addition, the Durbin–Watson statistic was required to fall between 1 and 3 to rule out autocorrelation, while Variance Inflation Factor (*VIF)* values below 2 and Tolerance values above 0.5 were

applied to ensure that multicollinearity was not present [27].

4. Results

4.1. Sample Description

In this survey, we selected a research sample of 257 students, with a fairly balanced distribution by gender and year of study. The sample size was chosen for both methodological and practical reasons. According to Hair *et al.* [33], when conducting multiple regression or Confirmatory Factor Analysis/Structural Equation Modeling (CFA/SEM) analyses, the sample size should be at least 5–10 times the number of observed variables; with more than 40 items in the TPB and MMT-R questionnaires, a sample of 200–400 is appropriate. At the same time, following the recommendations of Krejcie and Morgan [23], given the total HUST student population of several tens of thousands, a sample of around 250–300 is sufficient to maintain a margin of error below 7% at a 95% confidence level. Therefore, the 257 valid responses not only meet statistical requirements but are also practical and representative, reflecting the characteristics of university students at a stage when technology use habits for learning are strongly being shaped.

Table 1. Summary of descriptive statistics for the research sample

Sample Characteristics		Frequency	Percentage (%)
Gender	Male	140	54.5%
	Female	117	45.5%
Year of study	1	67	26%
	2	84	33%
	3	70	27%
	4	25	10%
	5	8	3%
	7	3	1%

The analysis results in Table 1 present the descriptive statistics of the survey sample. Out of 257 participants, 140 were male (54.5%) and 117 were female (45.5%), indicating a relatively balanced gender distribution. Most participants were second-year students (33%) and third-year students (27%), followed by first-year students (26%). Fourth- and fifth-year students accounted for smaller proportions, at 10% and 3% respectively. Overall, the majority of respondents were first- to third-year students (86%), which is representative of the group that is actively developing technology use habits for both learning and entertainment - an appropriate context for studying media multitasking behavior.

4.2. Reliability Analysis of the Media Multitasking Scale – Revised

Table 2 presents detailed information on the two subscales included in the Media Multitasking Scale - Revised. Specifically, the scale consists of two models: Compulsive Phone Checking (CPC; 6 items) and Media Distraction (MD; 12 items). The CPC model assesses the extent to which individuals feel compelled to frequently check their smartphones, whereas the MD model evaluates the level of passive distraction caused by media use during other ongoing activities. Abbreviations and corresponding item counts for each model are summarized below to facilitate interpretation of subsequent analyses.

The table also displays the internal consistency reliability of the scales using Cronbach's Alpha and the lowest item-total correlation. According to the standard proposed by Nunnally & Bernstein (1994), a scale is considered reliable if Cronbach's Alpha is greater than 0.7.

The reliability analysis of the MMT-R components shows that both CPC and MD subscales exceed a Cronbach's Alpha of 0.8, indicating high internal consistency and strong content coherence among the items. However, in the MD group, one item displayed a negative item-total correlation (-0.115), which reduced the internal consistency of the subscale. Specifically, MD7 (a reverse coded item, MD7_R) was the item exhibiting a negative item-total correlation (-0.115) and was therefore removed from the MD subscale. This pattern may indicate that some respondents experienced difficulty interpreting the reversed wording, which can occur after translation or when reverse coded items increase cognitive load. In addition, it may also reflect the possibility of inattentive responding for a subset of participants when encountering reverse worded items.

When this outlier item was removed, the Cronbach's Alpha increased from 0.895 to 0.905, indicating that the item had a significant negative impact on the overall reliability. This suggests that while the MD subscale generally demonstrates high reliability, careful review, and revision of item content are necessary to ensure conceptual consistency

Overall, these results confirm that the MMT-R scale is a suitable and reliable measurement tool for studying media multitasking behavior, provided that the quality of its individual items is carefully controlled.

Table 2. Reliability statistics of the models in the Media Multitasking Scale - Revised

No.	Model	Abbreviation	N of Items	Cronbach's Alpha	Min. Corr. Item-Total	Cronbach's Alpha if Item Deleted
1	Compulsive phone checking	CPC	6	0.883	0.502	0.851
2	Media distraction	MD	12	0.895	-0.115	0.905

4.3. Reliability Analysis of the Theory of Planned Behavior Scale

Table 3 presents the detailed structure of the TPB scale used in this study, consisting of six components: PBC, SN, AT, Behavioral Intention (IT), BB, and CB. Each component was measured using a different number of observed items, ranging from 2 to 9, capturing various stages of the behavioral formation process within the TPB framework.

The reliability analysis shows that BB (α = 0.769) and CB (α = 0.822) achieved high internal consistency, with all item–total correlations exceeding the minimum threshold of 0.30. Meanwhile, AT (α = 0.625), IT (α = 0.608), SN (α = 0.537), and PBC (α = 0.513) recorded Cronbach's Alpha values below the conventional 0.70 benchmark. However, methodological literature suggests that Alpha values of 0.60 or above may still be acceptable in exploratory studies, particularly when measurement instruments are adapted to a new cultural or behavioral context. Studies by Gottems *et al.* (2018) [34], Taber (2018) [35], and Daud *et al.* (2018) [36] highlight that Cronbach's Alpha in the range of 0.60 - 0.70 is often appropriate during the early stages of instrument development or when scales are applied in unfamiliar populations. This is especially relevant in the present study, where TPB is applied to a relatively new domain - digital media multitasking among Vietnamese university students, where psychological constructs may manifest differently across cultural settings.

During item-level diagnostics, PBC1, PBC2, IT4, and BB9 were removed due to low or negative item-total correlations. After eliminating these problematic items, the reliability of several subscales improved substantially. For example, Cronbach's Alpha for SN increased from 0.537 to 0.841, and noticeable improvements were also observed for AT and IT. These refinements demonstrate that the TPB scale can achieve acceptable reliability when low-quality items are removed. Nevertheless, relatively low Cronbach's Alpha values (particularly for IT and the initial SN and PBC subscales) imply higher measurement error, which may attenuate correlations among constructs and lead to more conservative regression estimates (i.e., smaller standardized coefficients and reduced statistical power). Therefore, regression findings involving constructs with lower reliability should be interpreted with caution, as the observed effects may underestimate the true relationships.

Although PBC was excluded from the regression analysis, this decision reflects methodological considerations rather than theoretical irrelevance. The low reliability of PBC (α = 0.513) may stem from several factors: (1) the subscale consisted of only two observed items, which naturally suppresses Cronbach's Alpha; (2) students may interpret "behavioral control" differently in technology-rich learning environments where multitasking tends to occur automatically; and (3) adapting measurement items to a new cultural context may reduce unidimensionality. Therefore, while PBC was omitted due to empirical limitations, its theoretical importance within TPB is acknowledged, and future research should refine and expand this subscale for better structural validity.

To ensure the robustness of the regression model, standard diagnostic tests were performed. The residual plot showed a random and symmetric distribution around zero, with no funnel-shaped patterns, indicating that the assumptions of linearity and homoscedasticity were met. The Q-Q plot demonstrated that residuals followed the theoretical normal distribution closely. The Breusch-Pagan test further confirmed the absence of heteroskedasticity ($p > 0.05$), while all *VIF* values were below 2, suggesting no multicollinearity among predictors. These diagnostic results verify that the regression model satisfies key statistical assumptions and that the estimates are reliable.

Overall, with appropriate adjustments and validation through diagnostic checks, the TPB scale in this study achieves acceptable internal reliability and is suitable for the subsequent analyses.

Table 3. Reliability statistics of the models in the TPB

No.	Model	Abbreviation	N of Items	Cronbach's Alpha	Min corr. Item-total	Cronbach's alpha if Item deleted
1	Perceived Behavioral Control	PBC	2	0.513	0.348	
2	Subjective Norms	SN	2	0.537	0.370	0.841
3	Attitude Toward	AT	4	0.625	0.108	0.783
4	Intention	IT	4	0.608	-0.020	0.777
5	Behavioral Beliefs	BB	9	0.769	0.335	0.782
6	Control Beliefs	CB	6	0.822	0.456	0.795

4.4. Linear Regression Analysis of Factors Influencing the Intention to Perform Multitasking Behavior in the Classroom

To test the research hypotheses, a linear regression model was constructed using the Ordinary Least Squares (OLS) method to evaluate the effects of theoretical factors on students' intention to engage in multitasking behavior during class. The results in Table 4 show that the model is statistically significant (F = 85.926, $Sig.$ = 0.000 < 0.05). The adjusted R^2 value is 0.577, indicating that approximately 57.7% of the variance in the dependent variable (behavioral intention) is explained by the independent variables included in the model. This suggests a relatively strong model fit within the context of student behavior research. Among the four factors included in the model based on the extended TPB, two variables - AT and BB - were found to be statistically significant with *Sig.* values less than 0.05, and standardized Beta coefficients of 0.494 and 0.269, respectively. These results indicate that both factors have a positive and meaningful association on students' intention to engage in multitasking behavior. Notably, AT emerged as the strongest predictor. Specifically, the more positively students perceive the use of personal devices in the classroom (such as convenient, enjoyable, or useful), the stronger their intention to multitask becomes. Similarly, BB suggest that if students believe that using devices in class provides practical benefits, they are more likely to continue the behavior - even if those benefits are based on perception rather than actual outcomes.

Table 4. Linear regression analysis of factors influencing the intention to engage in media multitasking in the classroom

Model	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics		Conclusion
	B	Std. Error	Beta	*t*	sig	Tolerance	VIF	
(Constant)	-0.164	0.188		-0.870	0.385			
SN	0.023	0.048	0.023	0.486	0.627	0.739	1.352	Reject H1
AT	0.542	0.057	0.494	9.468	0.000	0.617	1.620	Accept H2
BB	0.350	0.072	0.269	4.840	0.000	0.541	1.847	Accept H3
CB	0.105	0.055	0.101	1.903	0.058	0.598	1.671	Reject H4
Adjusted R^2: 0.577								
Durbin–Watson:1.849 ANOVA Significance Level: 0.000								
F-test value: 85.926								
H1: Subjective norm (SN) positively affects the intention to engage in media multitasking. *H2: Attitude (AT) positively affects the intention to engage in media multitasking.* *H3: Behavioral belief (BB) positively affects the intention to engage in media multitasking.* *H4: Control belief (CB) positively affects the intention to engage in media multitasking.*								
(*) The regression model was refined by retaining only significant predictors; therefore, only AT and BB were included in the final regression equation.								

In contrast, the remaining two factors- SN and CB - did not reach statistical significance, with *Sig.* values of 0.627 and 0.058, respectively (p>0.05). Therefore, these variables were considered to have no significant impact in the current model.

The lack of statistical significance for SN may be explained by the psychological traits and learning environment of university students, who tend to act independently and are less influenced by social expectations. Similarly, the non-significant effect of CB could reflect students' perception that they face few limitations or constraints in using devices during class, thereby reducing the role of perceived control in predicting behavior.

Additionally, *VIF* values for all variables were below 2, indicating no evidence of multicollinearity. This ensures that the regression coefficients are stable and reliable.

In summary, based on standardized Beta coefficients, the factors positively influencing students' intention to multitask in the classroom, in order of strength, are:

AT (β = 0.494): strongest positive effect;

BB (β = 0.269): second strongest positive effect;

CB (β = 0.101): not statistically significant; excluded from the final model;

SN (β = 0.023): not statistically significant; excluded from the final model.

The standardized regression equation is:

$$IT = 0.494 \times AT + 0.269 \times BB \quad (1)$$

These findings reveal a notable paradox: while educational systems often emphasize social norms and behavioral control, students' multitasking behavior appears to be primarily shaped by their personal perceptions of benefit and enjoyment. The exclusion of social and control factors from the final model suggests that current educational strategies may be targeting the wrong drivers-focusing on external enforcement rather than addressing the internal motivations that increasingly govern learning behavior in digital environments.

4.5. Correlation Analysis Between Multitasking Behavior and Behavioral Intention

The Pearson correlation analysis presented in Table 5 indicates that all variables are positively and significantly correlated (p = 0.000). As suggested by Field (2009) [28], all correlation coefficients were above the acceptable level of r > 0.5, indicating strong correlations, although their magnitudes varied. Specifically, the relationship between IT and MMT-R was the strongest (r = 0.614), followed by IT with CPC (r = 0.583), and the weakest was IT with MD (r = 0.532). This indicates that intention is closely associated with multiple aspects of multitasking behavior, but the overall MMT-R scale serves as the most robust indicator of this relationship. Regarding the relationship between behavior and intention, CPC - representing proactive phone use - shows a strong positive correlation with IT (r = 0.583). This implies that students who frequently check their phones tend to show higher levels of multitasking intention. Meanwhile, Media Distraction (MD) - representing passive distraction caused by the technological environment - also correlates significantly with IT (r = 0.532). This indicates that even unintentional distractions from notifications, sounds, or digital content are associated with higher multitasking intention.

Table 5. Pearson correlation between media multitasking level (MMT-R) and behavioral intention

Model		IT	MD	CPC	MMT-R
IT.--	Pearson Correlation	1	0.532**	0.583**	0.614**
	Sig. (2-tailed)		0.000	0.000	0.000
	N	257	257	257	257
MD	Pearson Correlation	0.532**	1	0.643**	0.913**
	Sig. (2-tailed)	0.000		0.000	0.000
	N	257	257	257	257
CPC	Pearson Correlation	0.583**	0.643**	1	0.900**
	Sig. (2-tailed)	0.000	0.000		0.000
	N	257	257	257	257
MMT-R	Pearson Correlation	0.614**	0.913**	0.900**	1
	Sig. (2-tailed)	0.000	0.000	0.000	
	N	257	257	257	257

**. Correlation is significant at the 0.01 level (2-tailed).

Notably, the MMT-R score - a composite measure of overall multitasking behavior - has the highest correlation with behavioral intention (r = 0.614). This finding suggests that students who have frequently multitasked in the past are more likely to sustain or intensify such behavior in the future. In other words, existing behavior is strongly associated with intention, aligning with theories of habit formation and repeated behavior.

Additionally, multitasking behaviors are also strongly interrelated: the correlation between MD and CPC is r equal 0.643; between MD and MMT-R is r equal 0.913; and between CPC and MMT-R is r equal 0.900. These figures indicate that both proactive and passive forms of media multitasking often occur together and are closely interrelated. This reflects the idea that technology-related behaviors in learning contexts are not isolated, but instead form a highly interconnected behavioral system.

5. Discussion

From a psychological perspective, frequent device-checking is not merely a habit but a response to internal needs, such as reducing boredom, maintaining social connection, or regaining a sense of control in the learning environment. These behaviors occur with such frequency that they are closely associated with higher levels of behavioral intention.

Within the TPB model, AT emerged as the most influential predictor of multitasking intention. This may be because students generally hold a positive evaluation of digital media as supportive to learning, for example enabling quick information search, note sharing, and task completion during class. When device use is perceived as beneficial and convenient, students are more likely to justify multitasking, resulting in a stronger intention to engage in it (β = 0.494). This suggests that students tend to rationalize their use of digital devices when they perceive it as beneficial - such as being convenient, enhancing learning, or making the class more engaging. BB also played a significant role, reflecting the importance of expected long-term benefits in sustaining the behavior. Conversely, PBC was excluded from the regression analysis due to low reliability. This indicates that perceived control is not a decisive factor in a context where multitasking behavior has become normalized within classroom settings.

The integration of TPB and MMT-R in this study created a comprehensive analytical framework that allowed for examination across different levels of behavioral formation. TPB served as the theoretical foundation, explaining how cognitive components such as AT, SN, and PBC contribute to the formation of behavioral intention - which is widely recognized as a reliable predictor of behavior.

On the other hand, MMT-R functioned as an empirical tool that captured actual multitasking behavior through specific components such as CPC and MD. In this framework, MMT-R was not merely a measurement scale but a quantitative instrument that reflects the frequency, form, and degree of multitasking embedded in students' daily academic routines.

The discovery of significant correlations and effects between actual behavioral variables (MD, CPC) and behavioral intention (IT) not only supports the TPB hypothesis that intention precedes behavior but also extends the theoretical model into high-tech learning contexts - where digital habits increasingly shape learning practices. The integration of TPB and MMT-R thus goes beyond methodological value; it serves as a test of the adaptability of behavioral theory in digital environments, where the line between intention and reflex is increasingly blurred by the constant presence of personal devices and digital media stimuli.

In addition, the findings of this study not only align with international research trends but also extend the current understanding of classroom media multitasking. The strong predictive effects of Attitude and Behavioral Beliefs suggest that students often perceive digital device use as beneficial, enjoyable, or personally meaningful an observation consistent with Alt (2015) [30] and Rosen *et al.* (2011) [31], who found that students frequently rationalize off-task device use by assigning academic or emotional value to it. Likewise, our results correspond with Junco and Cotten (2012) [12], whose work showed that positive attitudes toward technology are associated with higher multitasking frequency and more persistent patterns of media-related behaviors.

Moreover, the strong relationship between intention and actual multitasking behaviors (CPC, MD, and overall MMT-R) reflects the cyclical reinforcement mechanism described in prior international literature. Voorveld (2011) [32] proposed that media multitasking operates through a feedback loop in which prior behaviors shape expectations, which in turn reinforce intentions and promote continued multitasking practices. The present study provides empirical support for this mechanism in the Vietnamese context, where CPC and passive media distraction co-occur and continually reinforce each other.

The non-significant effects of SN and Control Beliefs also open an interesting point of dialogue with international findings. While some western studies report that social norms still exert a measurable influence on students' multitasking decisions, others highlight the increasingly habitual and automatic nature of digital media use in technology-saturated learning environments. Our data align more closely with the latter, showing that Vietnamese students' multitasking behavior is driven primarily by internalized habits and personal motivations rather than external expectations or perceived constraints. This suggests a convergence with

patterns observed in countries with high digital penetration.

Taken together, by juxtaposing the current results with previous international studies and identifying both parallels and contextual extensions, this research contributes an important empirical case to the global academic discourse on media multitasking. It reinforces the view that digital multitasking is a cross-cultural behavioral phenomenon shaped by the ubiquity of personal devices and digital media ecosystems rather than by local educational structures alone.

Data Availability, Anonymization, and Research Ethics Statement

All data used in this study were collected in a fully anonymized format and did not contain any personally identifiable information. Demographic variables were coded, and each response was assigned a random ID to prevent any possibility of re-identification. The anonymized dataset is available from the corresponding author upon reasonable request for non-commercial academic purposes.

This research complies with ethical standards for human subject research. Participation in the survey was entirely voluntary, and all respondents were informed about the study purpose, the anonymity of their responses, and their right to withdraw at any time. No personal identifiers, sensitive information, or tracking metadata were collected. As the study involved minimal-risk anonymous survey procedures, it was considered exempt from formal ethics review under the guidelines of Hanoi University of Science and Technology. The research team ensured strict confidentiality and secure handling of all collected data.

6. Limitations

An important limitation of this study concerns the TPB scales employed. The scales were adapted from prior research, which had primarily been conducted in international contexts, and then translated and modified for use with Vietnamese university students. The development procedure involved selecting items from previous studies, translating them from English into Vietnamese, consulting experts, and piloting the questionnaire with a small group of students to assess linguistic appropriateness. However, due to time and resource constraints, no previous research has directly validated TPB scales for classroom multitasking behavior in Vietnam. As a result, we had to remove several items that were semantically or culturally inappropriate. This translation and adaptation process may have reduced the number of items and consequently affected the internal reliability of certain TPB constructs (PBC, SN, AT, and IT).

In addition, cultural factors may have influenced the way Vietnamese students interpret constructs such as “subjective norms” or “perceived behavioral control,” which were originally developed in western contexts. Furthermore, the characteristics of our sample - comprising mostly second- and third-year engineering students - may reflect a group that is more independent and less sensitive to social pressures, thereby reducing the internal consistency of some TPB subscales.

This limitation should be acknowledged, and future studies should further refine and validate the TPB scales within the Vietnamese higher-education context, particularly with respect to classroom multitasking behavior.

7. Research Proposal and Future Directions

Based on the classification results, tailored support solutions are proposed for different groups of students.

For students who exhibit high levels of passive media multitasking, the research team suggests developing a prototype behavioral intervention model using psychological treatment approaches to address technology addiction. Future research should explore the relationship between multitasking intensity and media addiction tendencies, especially among students with high Attitude (AT) and BB scores-those with strong intrinsic motivation to persist in multitasking behavior despite being aware of its negative consequences. Analyzing indicators of technology dependence in this group may enable early identification of addiction risks and support the design of timely and appropriate intervention programs within educational settings.

In contrast, for students with low levels of passive multitasking, who demonstrate active multitasking and behavioral self-regulation, the research team proposes a practical technological solution for the next development phase: the creation of a real-time multitasking monitoring application in classrooms using MediaPipe, a motion-tracking platform developed by Google. This software would use a camera to detect distinctive behavioral cues such as eyes shifting away from the screen, frequent head tilts, or irregular hand movements-signals that may indicate off-task device use (e.g., scrolling, texting, or accessing unrelated apps).

Unlike restrictive behavior control systems, this solution is designed to promote self-monitoring and positive feedback. It allows students to become aware of their own lapses in concentration through real-time visual prompts. At the same time, aggregated data captured in real time can help instructors monitor the overall attention level of the class, allowing them to adjust pacing, modify teaching methods, or intervene at the right moment.

The project is currently in its initial trial phase, focusing on training the behavior recognition model in real classroom environments. The research team expects that this system will not only improve learning outcomes but also pave the way for a novel approach to applying artificial intelligence to support self-regulated learning behavior in digital education contexts.

Preliminary results and the prototype model are expected to be formally reported in the next stage of this research development.

8. Conclusion

This study explored the relationship between students' intention to engage in media multitasking and their actual multitasking behaviors in the classroom, based on a combined framework of the TPB and the MMT-R scale. The findings indicate that multitasking behavior is not only prevalent but also proactive and persistent in modern learning environments.

Behaviors such as CPC - representing active multitasking - and MD - representing passive multitasking - were both strongly correlated with behavioral intention. Notably, students who actively and frequently interact with digital devices are also more susceptible to unintentional distractions, suggesting that the boundary between active and passive forms of multitasking is increasingly blurred.

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