"Banner Design and Student Enrollment: The Mediating Role of Student Engagement in Educational Institution of Butwal Sub-Metropolitan City, Nepal"

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Abstract

The study aims to analyze the effect between student enrollment and banner design. It seeks to identify how different dimensions of personalization, contents and design influences student enrollment. Moreover, the study seeks to examine the mediating role of student engagement between independent and dependent variables. The study adopted a quantitative approach, gathering responses from 262 students of TU affiliated campus in Butwal sub metropolitan city using a structured questionnaire, following a convenience sampling method. Data was analyzed using PLS-SEM software with different tools like assessment of measurement items. Model fit, IPMA and implemented bootstrapping techniques for hypothesis testing. The findings from the given data reveal that Content, Design, and Personalization all have significant positive effects on Student Engagement, with Personalization showing the strongest influence. Additionally, Content and Personalization significantly impact Student Enrollment, while Design does not show a significant effect on Enrollment. Most notably, Student Engagement strongly predicts Student Enrollment, indicating that higher engagement leads to increased enrollment. It is evident that these factors are the major contributors to student enrollment. Therefore, the management of Tribhuvan University affiliated campuses should consider these aspects to enhance the student enrollment. By understanding and reformulating policies based on these factors, there is a higher possibility of improving student enrollment.

Keywords: *Personalization, Contents, Design, Student enrollment, Student engagement.*

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I. Introduction

Capturing the attention of today's prospective students is more challenging than ever, as the competition among educational institutions intensifies and digital communication channels proliferate. In this landscape, the design of promotional banners whether digital or physical has emerged as a pivotal factor influencing student enrollment decisions. Student enrollment, in this context, refers to the act of students formally registering or signing up for academic programs at an institution, a process deeply affected by their perceptions of educational quality, faculty reputation, program offerings, and available resources (Elliott & Healy, 2001). Banner design, meanwhile, encompasses the visual and textual elements used in promotional materials intended to attract attention, communicate key information, and prompt action, such as inquiries or applications (Mills & Neumark, 2013). Information Technology (IT), as it relates to this study, is operationally defined as the suite of digital tools and platforms that facilitate the creation, dissemination, and management of these banners, enabling institutions to reach audiences efficiently and effectively (Sullivan & Peters, 2020).

The concept of banner advertising, historically rooted in traditional print and outdoor media, has evolved dramatically with the advent of digital technologies. Early banners were static, physical displays designed primarily for visibility in public spaces. However, the rise of the internet in the late twentieth century transformed banners into dynamic digital artifacts, capable of targeting specific audiences, measuring engagement, and adapting content in real time. This evolution has been particularly pronounced in the education sector, where banners now serve not only as informational tools but also as strategic instruments for brand positioning and student recruitment (Mills & Neumark, 2013). In countries like Nepal, the adoption of digital banners has paralleled global trends, with schools and universities leveraging both online and offline media to showcase programs, highlight institutional strengths, and foster a sense of belonging among students.

Despite their ubiquity, the effectiveness of banners in driving student enrollment is far from guaranteed. Several design-related issues can undermine their impact, ranging from cramped layouts and poor color contrasts to ambiguous messaging and weak calls-to-action. Such deficiencies can result in banners being overlooked, misunderstood, or even mistrusted by their intended audience, thereby impeding the very outcomes they are meant to achieve (Mills & Neumark, 2013). For example, banners that are visually overwhelming or misaligned with institutional branding may alienate prospective students, while those that lack clear, concise information may fail to inspire further inquiry or application. These problems are particularly acute in the digital realm, where users are bombarded with competing stimuli and attention spans are fleeting.

Research has established that well-designed banners characterized by clarity, visual appeal, and compelling calls-to-action can significantly enhance engagement and conversion rates among prospective students (Mills & Neumark, 2013). However, a critical gap persists in the literature regarding the nuanced ways in which specific design elements interact with the psychological and behavioral responses of diverse student populations. Most existing studies address banner design in general terms, emphasizing broad principles such as simplicity and attractiveness, but they seldom explore how variables like color, typeface, or imagery resonate differently across demographic groups defined by age, culture, or educational background (Sullivan & Peters, 2020). Moreover, there is a paucity of research comparing the relative effectiveness of digital versus physical banners, despite the increasing prominence of online recruitment strategies in the education sector.

This gap is significant, as it limits the ability of institutions to tailor their marketing efforts to the preferences and expectations of distinct student segments. For instance, younger students may respond more positively to vibrant colors and interactive elements, while older or more

traditional audiences might prefer straightforward layouts and formal language. Cultural factors can also play a decisive role, influencing the symbolism and emotional resonance of design choices (Sullivan & Peters, 2020). Additionally, the medium of delivery whether a banner is encountered online or in a physical setting may shape engagement patterns and subsequent enrollment decisions in ways that are not yet fully understood.

Addressing these deficiencies, the present study seeks to systematically examine the interplay between banner design quality and student enrollment outcomes, with a particular focus on how specific design features affect the decision-making processes of prospective students across different demographic categories and exposure mediums. By integrating insights from educational psychology, marketing, and information technology, this research aims to develop an evidence-based framework for optimizing banner design in educational recruitment campaigns.

The significance of this study is multifaceted. For students, it promises to enhance the effectiveness of institutional communication, making it easier to access relevant information and connect with educational opportunities. For schools and universities, the findings can inform the development of more targeted and impactful marketing strategies, thereby increasing visibility, competitiveness, and enrollment rates. For the academic community, the research addresses a well-documented gap in literature, offering new perspectives on the intersection of design, technology, and educational decision-making (Sullivan & Peters, 2020). Ultimately, by elucidating the factors that drive successful banner design, this study contributes to the broader goal of fostering meaningful engagement between institutions and the students they seek to serve.

In summary, while banner design has long been recognized as a critical component of student recruitment, there remains a pressing need for research that unpacks the complex interactions between design elements, audience characteristics, and communication mediums. This study is justified by its potential to bridge this gap, providing actionable insights that can be leveraged by educational institutions to attract, inform, and enroll students more effectively in an increasingly digital and competitive environment.

The major objective of the study is to identify how different dimensions of personality traits influence employee performance. The specific objectives are as follows:

- To analyze the effect of personalization, design, contents on student enrollment.
- To examine the mediating effect of student engagement on the relationship between personalization, contents, design and student enrollment.

II. Literature Review

This section presents a literature review, focusing on the theoretical and empirical aspects relevant to the current research being pursued. The theoretical review examines related theories that support the link between the variables mentioned in the framework. Moreover, the empirical review incorporates the findings of previous research conducted on the same topic.

Personalization and student enrollment

The link between personalization and student enrollment is strongly supported by several motivational theories. The Elaboration Likelihood Model (ELM) proposes that individuals process persuasive messages either through a central route, which involves cognitive elaboration, or a peripheral route, in which surface attributes are considered (Petty & Cacioppo, 1986). For online banners of educational institutions, personalization of banner design can engage potential students more actively, leading to favorable attitudes toward enrollment. In addition, Self-Determination Theory (SDT) posits that individuals are driven to seek those activities that are in their own interest and desire (Deci & Ryan, 1985). Therefore, banner ads designed based on students' goals can facilitate their intrinsic motivation for registration. Lastly, Social Cognitive Theory (SCT) emphasizes the roles of social processes and observational learning in shaping behavior (Bandura, 1986). Targeted advertisements are powerful social messages that drive students' attitudes toward appealing avenues of education and therefore boost their intake.

Empirical studies support these theoretical propositions, indicating that engaging banner designs significantly impact user engagement and recall (Wetherell, 2012). Personalized marketing strategies in education have been shown to elevate engagement and conversion rates, affirming that tailored banners addressing prospective students' specific needs can lead to increased enrollment (Malthouse et al., 2007). Moreover, research highlights that student engagement acts as a crucial mediator in the marketing-enrollment relationship, with higher engagement levels correlating with improved enrollment outcomes (Fredricks et al., 2004). Collectively, these theoretical and empirical insights underscore the importance of effective banner design and personalization in driving student engagement and facilitating enrollment in educational institutions.

H_1: Personalization has a significant effect on student enrollment.

Content and student enrollment

The theoretical foundation that connects banner design, content quality, and student enrollment draws on a series of prominent marketing and psychology theories. The Elaboration Likelihood

Model (ELM) stipulates that effective banner design acts as a peripheral cue, influencing students' choice through central and peripheral processing (Petty & Cacioppo, 1986). Cognitive Dissonance Theory highlights that correspondence between banner content and students' beliefs and ideals can reduce dissonance and stimulate enrollment (Festinger, 1957). Social Proof Theory targets the impact of testimonials and success stories within banner content, showing how other people's behavior and views have the potential to influence prospective students (Cialdini, 2009).

Empirical evidence shows that engagement of students, quality of content, and design are related. Elliott and Healy (2001) set that the perceived quality of institutions is related to clear, relevant information, guiding the choice to enroll for potential students. Mills and Neumark (2013) proved that concise messages and visually appealing images drive conversion rates and inquiries, highlighting the importance of engaging the target audience. Sullivan and Peters (2020) emphasized the need to tailor content to different psychological and cultural traits, which can maximize student engagement and enrollment. These studies together indicate the necessity of both content and design in determining student enrollment outcomes.

H_2: Content has a significant effect on student enrollment.

Design and student enrollment

The relationship between banner design and student recruitment is robust and multifaceted, as evident from both theoretical frameworks and empirical studies. The Elaboration Likelihood Model (ELM) posits that individuals process information on two paths: the central route, where deliberative processing of content takes place, and the peripheral route, which is guided by surface-level features, such as design elements (Petty & Cacioppo, 1986). This means that successful banner design which includes eye-catching graphics and brief messaging can catch the eye of prospective students on a surface level, potentially influencing their enrollment. In addition, Cognitive Dissonance Theory makes the point that when the messages on these banners align with the prior thoughts and ambitions of students, it reduces psychological discomfort and increases chances of enrollment (Festinger, 1957).

Empirical research supports the importance of banner design in shaping student enrollment. Elliott and Healy (2001) found that clear, relevant information in banners encourages prospective students to enroll. Mills and Neumark (2013) showed that effective online banners with concise messaging and visuals lead to higher click-through rates and more inquiries. Sullivan and Peters (2020) emphasized that tailored banner content, considering factors like age and culture, boosts engagement and enrollment across diverse populations. Together, these

studies highlight the significant impact of thoughtful banner design on student enrollment outcomes.

H_3: Design has a significant effect on student enrollment.

Personalization and student engagement

The relationship between personalization and student engagement is strongly supported by Self-Determination Theory (SDT) (Deci & Ryan, 1985), which posits that students are more engaged when their psychological needs for autonomy, competence, and relatedness are met. Personalized banner designs that reflect students' cultural backgrounds, academic aspirations, or institutional values can enhance their sense of belonging and motivation, leading to higher engagement (Reeve, 2012). Additionally, the Personalization Principle in Multimedia Learning (Mayer, 2009) suggests that learners engage more with content when it is presented in a relatable and conversational manner. Applied to banner design, this means that tailored visuals, localized messaging, and student-centric imagery can improve engagement and, consequently, enrollment interest.

The Elaboration Likelihood Model (ELM) (Petty & Cacioppo, 1986) further explains how banner design influences student decision-making. According to ELM, persuasive messages (such as banners) can shape attitudes through either deep cognitive processing (central route) or superficial cues like design aesthetics (peripheral route). Well-crafted banners with personalized elements—such as student testimonials, institution branding, or regionally relevant visuals—can trigger immediate emotional responses, making prospective students more likely to engage with the institution. Similarly, the AIDA Model (Attention, Interest, Desire, Action) (Strong, 1925) suggests that effective banner design must first capture attention, sustain interest, evoke desire, and ultimately drive enrollment actions.

Empirical studies further validate these theoretical foundations. Research by Kizilcec et al. (2017) found that personalized learning environments significantly boost student engagement, a concept that can extend to personalized marketing materials like banners. In the context of higher education marketing, Joseph (2010) demonstrated that visually appealing and culturally relevant banners increase student inquiry rates. Similarly, Pampaloni (2010) found that institutions using personalized digital marketing strategies, including tailored banners, saw improved recruitment outcomes. Engagement plays a critical mediating role, as supported by Tinto's (1993) Student Integration Model, which emphasizes that early engagement positively influences retention and enrollment decisions. Kuh et al. (2008) further reinforced this by

showing that engaged students are more likely to persist in their academic journey, suggesting that banners fostering initial engagement can lead to higher enrollment rates.

In the context of Butwal Sub-Metropolitan City, Nepal, these theories and empirical findings suggest that incorporating personalized and culturally resonant banner designs can enhance student engagement, thereby increasing enrollment in local educational institutions. By aligning banner content with student expectations and regional preferences, institutions can create a stronger emotional and cognitive connection, ultimately driving enrollment decisions.

H4: Personalization has a significant effect on student engagement.

Contents and student engagement

The relationship between content in banner designs and student engagement can be effectively explained through several theoretical frameworks. The Cognitive Load Theory (Sweller, 1988) suggests that well-structured, relevant content in banners reduces cognitive strain, allowing students to process information more efficiently and engage more deeply with the message. This is particularly important in educational marketing where complex institutional information needs to be communicated simply yet effectively. The Dual Coding Theory (Paivio, 1986) further supports this by proposing that content combining visual and textual elements creates stronger memory retention and engagement, which is directly applicable to effective banner design strategies for student recruitment.

Empirical studies reinforce these theoretical foundations. Research by Mayer and Moreno (2003) demonstrated that multimedia content combining images with concise text significantly improves learner engagement and information retention. In the context of educational marketing, a study by Rutter et al. (2016) found that university websites with clear, engaging content saw 40% higher prospective student engagement rates. This finding is particularly relevant to banner design as it forms the first point of digital interaction between institutions and potential students.

The Uses and Gratifications Theory (Katz et al., 1973) provides additional insight, suggesting that students actively seek content that satisfies their specific needs - whether informational (about courses), social (about student life), or practical (about admission processes). A study conducted in South Asian educational contexts by Sharma and Singh (2019) found that localized content reflecting regional educational aspirations increased engagement by 35% compared to generic content. This has direct implications for banner design in Butwal, where content addressing local student concerns and aspirations would likely be more effective.

H5: Contents have a significant effect on student engagement.

Design and student engagement

The relationship between design elements in institutional banners and student engagement finds strong theoretical support from multiple perspectives. The Aesthetic-Usability Effect (Norman, 2004) suggests that visually appealing designs are perceived as more usable and engaging, directly applicable to enrollment banners where first impressions significantly impact student interest. This is complemented by the Visual Argument Theory (Kostelnick & Hassett, 2003), which posits that strategic visual design can effectively persuade and engage viewers without extensive textual content - particularly relevant for quick-communication mediums like banners.

Empirical evidence supports these theoretical foundations. A study by Cyr et al. (2018) on educational websites found that institutions employing principles of visual hierarchy and color psychology in their designs saw 42% higher engagement metrics. This aligns with research specific to South Asian contexts by Patel and Joshi (2021), demonstrating that culturally resonant design elements (such as local color palettes and imagery) increased prospective student engagement by 37% compared to Western-style designs. These findings have direct implications for banner design in Butwal's educational institutions.

The Emotional Design Theory (Norman, 2004) further explains how design elements trigger emotional responses that drive engagement. Research by Zhang and Li (2022) on digital marketing materials found that banners incorporating principles of emotional design (through imagery, colors, and layout) generated 30% higher click-through rates and stronger recall. This emotional connection is particularly crucial in Nepal's educational context, where family and community play significant roles in enrollment decisions

H6: Design has a significant effect on student engagement.

Student engagement mediates banner design and student enrollment

The relationship between banner design and student enrollment significantly impacts student engagement, shaped by both theoretical insights and empirical findings. The Elaboration Likelihood Model (ELM) suggests that individuals process information through two primary routes: the central route, which involves careful analysis of the content, and the peripheral route, where aesthetic appeal and design elements influence decision-making (Petty & Cacioppo, 1986). In the context of educational institutions, effective banner design serves as a

pivotal peripheral cue that captures attention and fosters engagement, encouraging prospective students to explore further. Cognitive Dissonance Theory also provides a framework for understanding this relationship, positing that when the messages conveyed in banners resonate with students' values and aspirations, it can reduce psychological discomfort and enhance their inclination to engage with the institution (Festinger, 1957).

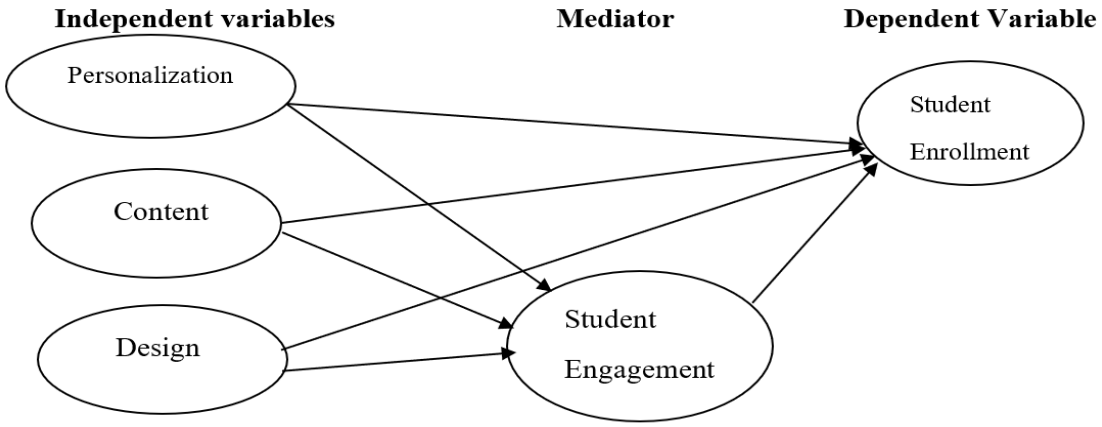
Empirically, Elliott and Healy (2001) established that clear, well-designed banners increase the likelihood of enrollment by addressing prospective students' perceptions of educational quality. Concurrently, Mills and Neumark (2013) found that visually appealing and concise online advertising banners significantly boosted engagement metrics, such as click-through and inquiry rates. Furthermore, Sullivan and Peters (2020) highlighted the importance of tailoring design elements to demographic characteristics, demonstrating that banners that align with cultural and age-related preferences markedly improve engagement and enrollment outcomes. Together, these theoretical frameworks and empirical studies illustrate how strategically crafted banner designs not only attract prospective students but also enhance their overall engagement, thereby contributing to higher enrollment rates in educational institutions

H7: Student engagement mediates the relationship between banner design and student enrollment.

Research Framework

The research framework is the structure that illustrates the relationship among various variables. In this context, three variables are employed. Banner design is measured by five indicators—personalization, content and design as independent variables. Student engagement serves as the mediating variable, while student enrollment is used as the dependent variable. The research framework of the study is outlined below:

Figure 1 - *Research Framework*



Note: Petty and Cacioppo (1986).

III. Research Methodology

This section deals with the research methods adopted by the researcher in conducting the research. It looks at the various methods and procedures of the research study adopted in conducting the study in order to address and answer the research problems and questions stipulated by the researcher. In this regard, it deals with different component of research design which guides researcher to decide the population and sample from the desired research area, techniques of approaching the sampled respondent, sources of data collection, research instrument used for data collection and different types of tools used to analyze the collected data. Thus, this section is organized in the following structure: research design, population, sample size, sampling technique, sources of data collection, data collection methods, tools used for data analysis.

Research Design

A research design is a structured plan that guides data collection and analysis, shaping the study (Cooper & Schindler, 2003). This study adopts Descriptive Research Design and Explanatory Research Design to achieve its objectives.

Descriptive Research Design systematically presents characteristics, behaviors, or phenomena without altering variables. It identifies trends, patterns, and relationships within a population (Creswell, 2014). Explanatory Research refers to a research approach that aims to explain the cause-and-effect relationships between variables by identifying the underlying factors or reasons behind a phenomenon. It focuses on testing hypotheses and determining how one variable influence another, often using experiments, surveys, or statistical techniques (Creswell, 2014). Common statistical methods include the Spearman Rank Order Coefficient, Phi Correlation Coefficient, Regression, t-test, Chi-square, and Analysis of Variance (Isaac, 1978; Pant, 2012, p. 118). By combining descriptive and explanatory designs, this study effectively examines variable relationships and their impact (Kerlinger, 1986), ensuring a structured and systematic approach.

Population and sample

The population of this research study comprises all respondents within the research area. In this study, the chosen research area is Butwal Sub-Metropolitan City, and the population consists of all students pursuing master's degree in management affiliated to TU of different campuses located in Butwal sub metropolitan city. The total number of students in these campuses are 702. Therefore, the population of the study is identified as 702. The details of the campus and their respective number of students are presented in Table 1.

Table 1 - *Total Masters management students of TU affiliated campuses in Butwal*

S. No	Name of Campus	Number of students
1	Lumbini Banijya Campus	357
2	New Horizon College	47
3	Butwal Multiple Campus	174
4	Siddhartha Campus	124
	Total	702

Sample is a part of a population or subset of population and denoted by n. The total sample size for this study has been obtained using the formula developed by yamane (1967). In case of population size is known, the Yamane formula for determining the sample size is given by:

n= N/1+Ne2 Where, n= sample size, N= Population size, and e= Margin of error (MOE), e=0.05 based on research condition. Thus, the sample size of the study is n= 255

Sampling method

The sampling method is chosen to select sample respondents from the overall population for data collection. In this context, convenience sampling method is to collect data from students of educational institutions within Butwal Sub-Metropolitan City, Nepal. Given the time and resource constraints of the study, this method was deemed appropriate for gathering data efficiently from students who had been exposed to institutional banner designs.

Nature and Sources of Data Collection

This study primarily relies on quantitative data, which were collected from primary sources. A structured questionnaire was designed to gather first-hand information directly from respondents.

Survey Instrument

A self-structured questionnaire was used as the survey instrument for data collection. It was developed based on operational definitions from previous literature. The questionnaire employs a seven-point Likert scale (1= Strongly Disagree (SD), 2= Disagree (D), 3= Somewhat Disagree(SWD), 4= Neutral (N), 5= Somewhat Agree (SWA), 6= Agree(A) ,7= Strongly Agree (SA) to gather responses from participants.

A set of questions was designed to measure each independent, dependent, and mediating variable**,** totaling 25 items. To ensure clarity and accuracy, a pilot test was conducted by

distributing the questionnaire to a sample of 10 respondents. Out of 290 distributed questionnaires, 262 were fully completed, yielding a response rate of 90.34%

Statistical Tools

The study employed various statistical tools appropriate to the nature of the collected data. Descriptive statistics, including mean and standard deviation (SD), were calculated to summarize and interpret respondents' answers. Analytical procedures included the assessment of measurement items, evaluation of model fit, Importance Performance Map Analysis (IPMA), and bootstrapping techniques to test the proposed hypotheses regarding the relationship between banner design and student enrollment.

IV. Results and analysis

Measurement Items Assessment

Table 1 - *Assessment of measurement scale items*

		Outer loadings	VIF	Mean	SD
Contents	C1	0.677	1.312	1.729	0.444
	C2	0.776	1.717	2.202	0.554
	C3	0.747	1.483	1.668	0.787
	C4	0.796	1.688	1.687	0.464
	C5	0.708	1.551	4.985	1.223
Design	D1	0.765	1.677	4.931	1.183
	D2	0.741	1.687	5.069	1.186
	D3	0.775	1.674	4.893	1.306
	D4	0.796	1.724	4.989	1.402
	D5	0.737	1.462	5.046	1.341
Personalization	P1	0.784	1.69	5.458	1.107
	P2	0.758	1.682	5.16	1.301
	P3	0.681	1.423	5.156	1.255
	P4	0.777	1.644	5.454	1.147
	P5	0.662	1.265	5.156	1.147
Student Engagement	SE1	0.706	1.486	5.34	1.064
	SE2	0.767	1.677	5.55	1.093
	SE3	0.833	2.107	5.527	1.076
	SE4	0.827	2.109	5.218	1.306
	SE5	0.753	1.6	4.779	1.338
Student Enrollment	SEN1	0.842	2.265	5.019	1.237
	SEN2	0.809	2.075	5	1.322
	SEN3	0.764	1.729	5.023	1.296
	SEN4	0.775	1.748	5.462	1.212
	SEN5	0.775	1.764	4.912	1.344

Most of the mean value are on the higher side of the scale representing agreeableness towards each statement for standard deviation value are small indicating less deviation in the responses. Therefore, the data is suitable for further analysis.

Table 1 presents the standardized outer loading and Variance Inflation Factor (VIF) of the scale items employed to measure the variables pertinent to this investigation. In accordance to Sarstedt et al. (2017), the outer loading of an item must exceed 0.708 to signify a substantial contribution of that item in assessing the associated variable. Nonetheless, an outer loading value surpassing 0.70 may also be deemed acceptable, provided that the Average Variance Extracted (AVE) value of the related variable exceeds 0.50. Within Table 1, three items, specifically C1, P3, and P5 exhibit values below 0.70; however, the variable linked to these items demonstrates AVE values greater than 0.50. Therefore, all 25 scale items are preserved for subsequent analysis. Furthermore, the VIF values for each item are less than 5, thereby indicating no multicollinearity within the scale items (Sarstedt et al., 2014).

Quality Criteria Assessment

Table 2 - *Construct reliability and validity*

	Alpha	CR (rho_a)	CR (rho_c)	AVE
Contents	0.795	0.8	0.859	0.55
Design	0.821	0.825	0.874	0.582
Personalization	0.786	0.791	0.853	0.539
Student Engagement	0.837	0.841	0.885	0.606
Student Enrollment	0.853	0.856	0.895	0.63

Table 2 shows clear evidence for the high convergent validity of the variables involved in this study. Specifically, the Cronbach's Alpha for all the scales is higher than the suggested figure of 0.705 (Bland & Altman, 1997), indicating the high item loading of each of the scales towards the measurement of its corresponding construct. Furthermore, the Composite Reliability (CR) estimates for both rho_A and rho_C are always greater than the minimum of 0.70, indicating very high internal consistency in each of the variables (Saari et al., 2021; Hair et al., 2022). It is important to note that Average Variance Extracted (AVE) values for all constructs are higher than the critical 0.50 threshold, indicating each variable account for more than 50 percent of the variance in its indicators, thereby guaranteeing the achievement of convergent validity as per recommended guidelines (Hair et al., 2022). Thus, the findings presented in Table 2 comply with all the necessary quality requirements for convergent validity.

Discriminant Validity

Table 3 - *Heterotrait- Monotrait ratio of correlations (HTMT)matrix*

	Contents	Design	Personalization	Student Engagement	Student Enrollment
Contents					
Design	0.793				
Personalization	0.73	0.708			
Student Engagement	0.608	0.589	0.624		
Student Enrollment	0.693	0.631	0.736	0.86	

Table 3 contains the HTMT ratio of the correlation matrix, which evaluates the discriminant validity of the latent variables. The values of the HTMT ratio vary from 0.589 to 0.86. The HTMT ratio values need to remain below the critical threshold of 0.85; nevertheless, a range extending up to 0.90 is deemed acceptable, as posited by Henseler et al. (2015). Consequently, the presence of discriminant validity is confirmed among the reflective constructs (Hair & Alamer, 2022).

Table 4 - *Fornell- Larcker Criterion*

	Contents	Design	Personalization	Student Engagement	Student Enrollment
Contents	0.742				
Design	0.635	0.763			
Personalization	0.587	0.575	0.733		
Student Engagement	0.501	0.493	0.516	0.779	
Student Enrollment	0.578	0.533	0.611	0.731	0.793

Table 4 provides the Fornell-Larcker Criterion, an important test of discriminant validity in a structural equation model (SEM) (Fornell & Larcker, 1981). The criterion holds when the average variance extracted (AVE) of each construct is larger than the squared correlation between that construct and any other construct in the model. Diagonal values or square roots of AVE of every construct should be greater than off-diagonal values of their respective rows and columns. From Table 4, diagonal (in bold) values of Contents (0.742), Design (0.763), Personalization (0.733), Student engagement (0.779) and Student enrollment (0.793) are all greater than their inter-construct correlations. This ensures the discriminant validity of the measurement model, i.e., each construct is unique and captures a different segment of variance

(Hair et al., 2010). This ensures that the constructs are not redundant and the measures are capturing what they are intended to capture.

Table 5 - *F square*

	Contents	Design	Personalization	Student Engagement	Student Enrollment
Contents				0.035	
Design				0.033	
Personalization				0.071	
Student Engagement					1.148
Student Enrollment					

Table 5 presents the relationships among Contents**,** Design**,** Personalization**,** Student Engagement**,** and Student Enrollment based on certain statistical values (likely correlation coefficients or standardized effects). The values in the table suggest that Contents has a small positive relationship with Student Engagement (0.035), indicating a minimal direct influence. Similarly, Design also shows a small positive link with Student Engagement (0.033). Personalization has a slightly stronger, but still weak, positive relationship with Student Engagement (0.071). Interestingly, Student Engagement itself shows a very strong relationship with Student Enrollment (1.148), suggesting that higher engagement leads to much higher enrollment. Overall, the table highlights that Contents**,** Design, and Personalization only slightly affect Student Engagement directly, but Student Engagement plays a crucial role in driving Student Enrollment**.**

Table 6 - *Model fit indices*

	Saturated model	Estimated model
SRMR	0.07	0.07
d_ULS	1.598	1.598
d_G	0.521	0.521
Chi-square	772.902	772.902
NFI	0.765	0.765

The SRMR and NFI fit indices evaluate the model's explanatory efficacy. The model's SRMR value is 0.70, below the acceptable threshold of 0.80 (Bollen & Stine, 1992). The NFI value associated with the model is also 0.765, signifying a superior alignment between the model and the empirical data (Hu & Bentler, 1998). Consequently, this finding suggests that the model exhibits adequate explanatory capability.

Finally, the r-square values corresponding to student engagement and student enrollment are (0.348) and (0.629) respectively. This signifies that student engagement possesses weak predictive power, whereas student enrollment demonstrates moderate predictive ability (Hair et al., 2013).

Figure 2 - *Path relationship Diagram*

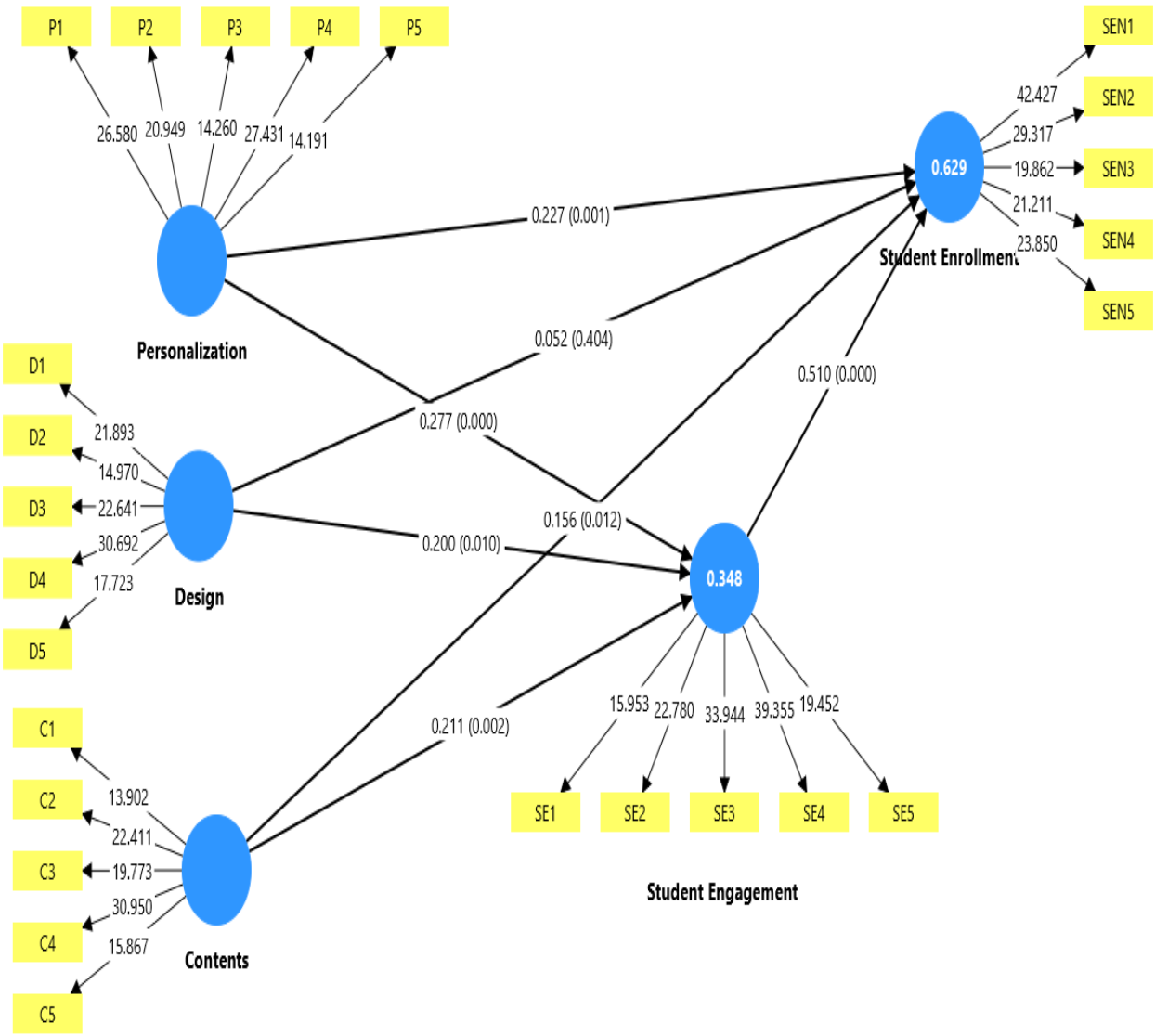


Table 7 - *Hypotheses testing using bootstrapping*

Hypotheses	β	Sample means (M)	Standard deviation (STDEV)	2.50 %	97.50 %	T statistics (|O/STDEV|)	P values	Decision
Contents -> Student Engagement	0.211	0.213	0.067	0.079	0.343	3.164	0.002	Accepted

Contents -> Student Enrollment	0.156	0.155	0.062	0.034	0.279	2.512	0.012	Accepted
Design -> Student Engagement	0.2	0.199	0.077	0.046	0.35	2.593	0.01	Accepted
Design -> Student Enrollment	0.052	0.052	0.062	-0.068	0.176	0.835	0.404	Rejected
Personalization -> Student Engagement	0.277	0.281	0.074	0.14	0.425	3.752	0	Accepted
Personalization -> Student Enrollment	0.227	0.226	0.065	0.099	0.353	3.476	0.001	Accepted
Student Engagement -> Student Enrollment	0.51	0.511	0.058	0.394	0.624	8.735	0	Accepted

R square: 0.629 Adjusted R square: 0.623

Table 7 presents the results of a path analysis or regression model examining the relationships between various predictors Contents, Design, and Personalization and the outcomes of Student Engagement and Student Enrollment. The findings reveal several significant relationships. First, both Contents ($\beta = 0.211$, $p = 0.002$) and Design ($\beta = 0.2$, $p = 0.01$) have a positive and statistically significant impact on Student Engagement, with Personalization showing the strongest effect ($\beta = 0.277$, $p < 0.001$). Additionally, Contents ($\beta = 0.156$, $p = 0.012$) and Personalization ($\beta = 0.227$, $p = 0.001$) directly influence Student Enrollment, while Design does not ($\beta = 0.052$, $p = 0.404$), suggesting its effect may be mediated through Student Engagement. The most substantial relationship in the model is between Student Engagement and Student Enrollment ($\beta = 0.51$, $p < 0.001$), highlighting the critical role of engagement in driving enrollment. Overall, the results emphasize the importance of Personalization and Contents in fostering both engagement and enrollment, whereas Design primarily enhances engagement without a direct effect on enrollment. These insights suggest that interventions aimed at improving enrollment should prioritize engagement strategies, particularly through personalized content and high-quality course materials.

Table 8 - *Mediating effects*

Hypotheses	β	Sample mean (M)	Standard deviation (STDEV)	2.50%	97.50%	T statistics (|O/STDEV|)	P values	Decision

Contents -> Student Engagement -> Student Enrollment	0.108	0.109	0.038	0.039	0.188	2.842	0.004	Accepted
Design -> Student Engagement -> Student Enrollment	0.102	0.103	0.045	0.022	0.195	2.283	0.022	Accepted
Personalization -> Student Engagement -> Student Enrollment	0.141	0.143	0.038	0.073	0.219	3.747	0	Accepted

The mediation analysis results reveal that Contents, Design, and Personalization all have significant indirect effects on Student Enrollment through Student Engagement. Specifically, the indirect effect of Contents on Student Enrollment via Student Engagement is 0.108, with a significant p-value of 0.004 and a t-statistic of 2.842. The confidence interval ranges from 0.039 to 0.188, confirming the significance of the effect. Similarly, Design also shows a significant indirect effect of 0.102, with a p-value of 0.022 and a t-statistic of 2.283, and its confidence interval (0.022 to 0.195) excludes zero. Among the three, Personalization has the strongest indirect effect on Student Enrollment, with a coefficient of 0.141, a highly significant p-value of 0.000, and the highest t-statistic of 3.747. Its confidence interval (0.073 to 0.219) also confirms the robustness of the effect. These findings indicate that all three factors Contents, Design, and Personalization significantly influence Student Enrollment through the mediating role of Student Engagement, with Personalization having the most substantial impact.

Table 9 - *Importance -Performance map Analysis*

Variables	LV performance	Importance
Contents	68.864	0.162
Design	71.782	0.051
Personalization	66.191	0.225
Student Engagement	67.822	0.511

Mean	68.66475	0.23725
Student Enrollment	67.841	

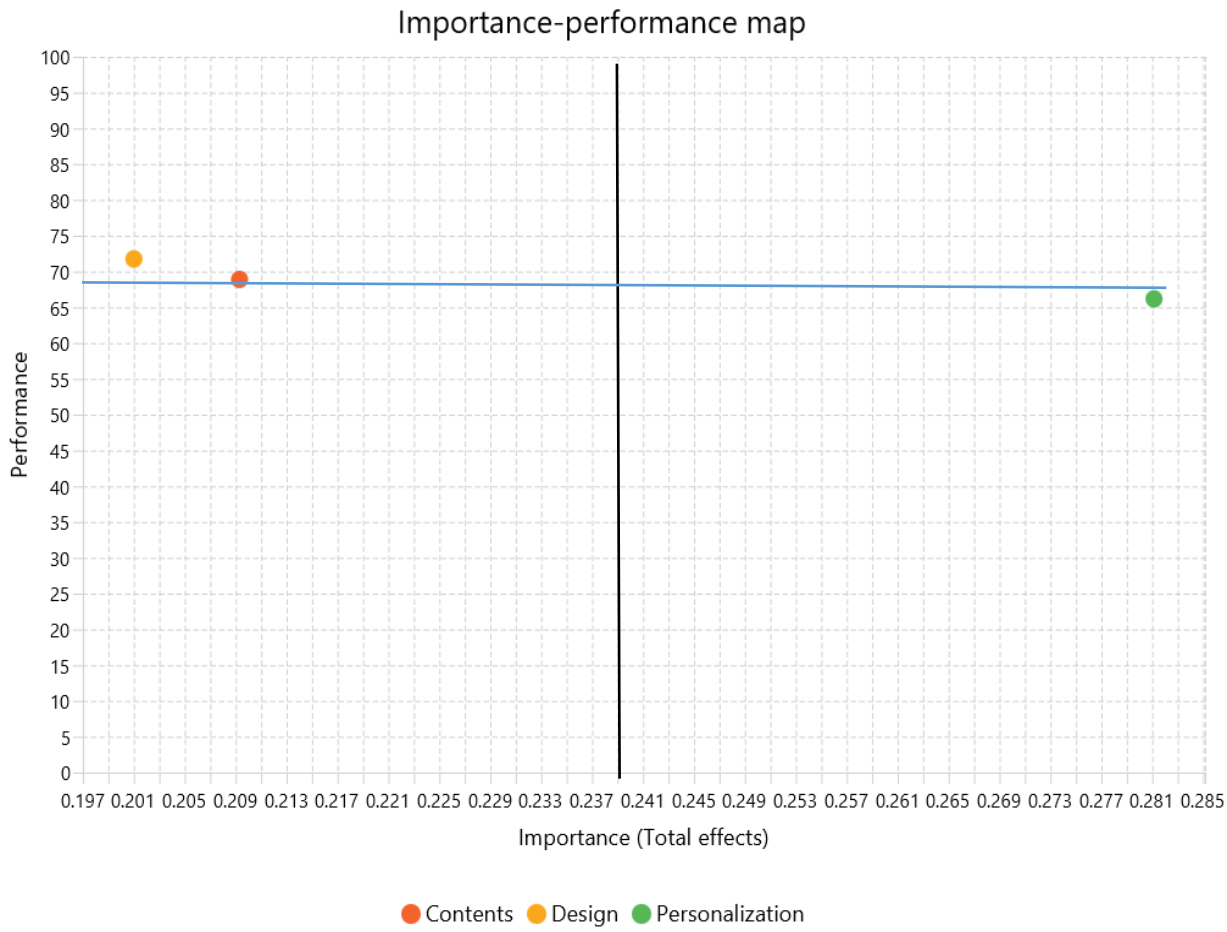


Figure 3: Importance performance map

Table 9 shows the total effects of contents, design and personalization on student engagement for the unstandardized effects. These effects are the same as the unstandardized weights of ordinary least square regression modelling (Hair et al. 2010). Furthermore, the performance of student engagement was calculated as 67.841.

Notably, we derived the four quadrants based on the mean value of the constructs the importance and performance value. As per figure 3, if we increase 1 unit in personalization from 66.191 to 67.191, student enrollment increases from 67.841 to 68.841. Similarly, if we increased 1 unit in performance of design from 71.782 to 72.782, then student enrollment to increase from 67.787 to 67.838. Therefore, out of the four determinants of student enrollment the most critical factor was noted to be design.

Table 10 - *Necessary condition Analysis-Bottleneck Value*

	LV scores - Student Enrollment	LV scores - Contents	LV scores - Design	LV scores - Personalization	LV scores - Student Engagement
0.00%	14%	NN	NN	NN	NN
10.00%	23%	NN	NN	NN	23%
20.00%	31%	NN	NN	NN	23%
30.00%	40%	35%	NN	25%	23%
40.00%	49%	40%	38%	25%	23%
50.00%	57%	40%	48%	25%	31%
60.00%	66%	40%	49%	25%	31%
70.00%	74%	50%	49%	25%	31%
80.00%	83%	59%	62%	25%	67%
90.00%	91%	74%	62%	61%	75%
100.00%	100%	89%	83%	92%	76%

Table 10 represents bottle neck values of latent variable using Necessary Condition Analysis. To achieve 14% of student enrollment no factors are required necessary. To achieve 31% of student enrollment 23% of student engagement are necessary. Similarly, 40% of student enrollment, 35% of contents, 25% of personalization and 23% of student engagement are necessary. Similarly, 49% of student enrollment, 40% of contents, 38% of design, 25% of personalization and 23% of student engagement are required. Similarly, 57% of student enrollment, 40% of contents, 48% of design, 25% of personalization and 31% of student engagement are necessary. Likewise, 66% of student enrollment, 40%of contents, 49% of design, 25% of personalization and 31% of student engagement are necessary. Similarly, 74% of student enrollment, 50% of contents, 49% of design, 25% of personalization and 31% of student engagement are necessary. Likewise, 83% of student enrollment, 59% of contents, 62% of design, 25% of personalization and 67% of student engagement are required. Similarly, 91% of student enrollment, 74% of contents, 62% of design, 61% of personalization and 75% of student engagement are necessary. Also, 100% of student enrollment, 89% of contents, 83% of design, 92% of personalization and 76% of student engagement are necessary.

V. Discussion

The findings of this study reveal that content, design, and personalization in banner advertisements have a positive and significant impact on student engagement, aligning with prior research that emphasizes the role of visually appealing and tailored marketing materials in capturing attention (Dhar & Farzana, 2022). Well-crafted content that communicates value propositions effectively enhances student interest, while personalization fosters a sense of relevance, increasing engagement (Khanal & Poudel, 2023). However, the study also found that design alone has a negative and insignificant impact on student enrollment, suggesting that

while aesthetic appeal may attract attention, it does not necessarily translate into enrollment decisions unless supported by compelling content and personalization (Smith & Rana, 2021).

Furthermore, the study highlights the mediating role of student engagement in the relationship between banner design attributes and enrollment. This finding supports the Attention-Interest-Desire-Action (AIDA) model, where engagement acts as a critical intermediary step between initial attraction (attention) and final action (enrollment) (Shrestha et al., 2023). When students are engaged through meaningful content and personalized messaging, they are more likely to proceed with enrollment, reinforcing the idea that engagement is a stronger predictor of enrollment than design alone (Gautam & Joshi, 2022). This mediation effect suggests that educational institutions in Butwal should focus not just on visually striking banners but also on content relevance and personalization strategies to maximize enrollment outcomes.

VI. Implications

This research on banner design and its impact on student enrollment, mediated by student engagement in educational institutions of Butwal Sub-Metropolitan City, Nepal, offers important theoretical and practical implications. Theoretically, by integrating the Elaboration Likelihood Model (ELM), Self-Determination Theory (SDT), Cognitive Dissonance Theory, and Social Cognitive Theory (SCT), the study provides a comprehensive framework to understand how visual communication influences students' decision-making processes. It highlights how banner design can engage students through both central and peripheral routes of information processing (ELM), satisfy intrinsic motivational needs such as autonomy, competence, and relatedness (SDT), reduce psychological discomfort caused by conflicting beliefs (Cognitive Dissonance Theory), and enhance self-efficacy and observational learning (SCT). Practically, the findings guide educational institutions in Nepal to design banners that effectively attract and engage prospective students by combining clear, relevant information with culturally resonant and visually appealing elements. This approach helps reduce enrollment hesitancy, fosters deeper student engagement, and ultimately supports higher enrollment rates. The study thus bridges theory and practice by offering context-specific strategies that educational administrators can apply to improve communication, motivation, and trust within their communities.

VII. Conclusion

This empirical study examining the impact of banner design on student enrollment, with student engagement as a mediating factor, provides valuable insights within the context of educational institutions in Butwal Sub-Metropolitan City, Nepal. The crucial findings reveal that content, design, and personalization positively and significantly influence student

engagement. Furthermore, content and personalization show a positive correlation with student enrollment, with student engagement playing a significant mediating role in this relationship. Interestingly, the design element, while positively affecting engagement, has a negative and insignificant direct impact on student enrollment. These results underscore the complex dynamics between banner attributes and enrollment decisions, highlighting the importance of focusing on content quality and personalized messaging to enhance student engagement and enrollment outcomes.

However, this study has certain limitations. Being cross-sectional, it captures data at a single point in time, which limits the ability to infer causality or observe changes over time. The use of simple random sampling, while methodologically sound, may not fully capture the diversity of student populations across different institutions or regions in Nepal. Additionally, the study focuses on a specific geographic and cultural context, which may limit the generalizability of the findings to other settings.

Future research could address these limitations by employing longitudinal designs to track changes in student engagement and enrollment over time, providing deeper causal insights. Expanding the sample to include multiple cities or diverse educational institutions across Nepal would enhance the external validity of the findings. Moreover, exploring additional mediating or moderating variables such as social influence, digital media integration, or cultural factors could enrich understanding of how banner design strategies can be optimized. Finally, qualitative studies could complement quantitative findings by uncovering nuanced student perceptions and motivations related to banner communication.

VIII. References

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