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FROM TEACHERS' CREATIVITY TO STUDENTS' CURIOSITY: THE MEDIATING ROLE OF ENTREPRENEURSHIP EDUCATION IN BUSINESS SCHOOLS OF HYDERABAD, SINDH, PAKISTAN

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<p>Keywords:</p>	<p>Design Thinking, Entrepreneurship Education, Curiosity Quotient, Teacher Creativity, Business Students, Pakistan, SEM-PLS</p>



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1. INTRODUCTION

It is broadly accepted that entrepreneurship has a great influence on national economic development and job creation and is responsible for poverty reduction (Shepherd et al., 2020; Peprah & Adekoya, 2020; Bosma et al., 2018). However, Pakistan faces the challenge of a lack of entrepreneurs and high unemployment rates among the business school graduates, which is a gap between targeted vocational and higher education and employment outcomes (Saptono et al., 2020; Wardana et al., 2020). Entrepreneurship education can be beneficial to the goals, creativity and motivation of students (Anjum et al., 2019; Nabi et al., 2018). It does this by providing learning and experience-based teaching, knowledge development, aspirations and entrepreneurial capabilities (Kautonen et al., 2015; Li & Wu, 2019). In spite of these, the direct impact of the teacher on the students' curiosity, which is one of the most important prerequisites for entrepreneurial thinking, has been undervalued by scholars many times. This study fulfills the following four fundamental gaps: (1) Instructor creativity and student curiosity in Pakistani business schools has not been explored; (2) There is a missing link between instructor's creativity and student's curiosity, which is the role of entrepreneurship education; (3) Design thinking is a new dimension of inquiry, which was not explored; (4) This study has educational policy implications for Sindh. This study analyses these dimensions together, which adds to the growing body of literature on entrepreneurship education, and provides policy makers with empirical evidence-based recommendations.

2. Literature Review

Critical and creative thinking are two of the major skills required in education according to the fourth industrial revolution (Beghetto & Kaufman, 2014; Narmaditya et al., 2018). In the teaching method, creative teachers utilize various techniques, tools and materials to enhance the comprehension of students to achieve meaningful teaching (Ayob et al., 2013). The results of the study showed that the use of instructional creativity has always been found to have a positive effect on student learning results (Rasmi, 2012; Arifani & Suryanti, 2019). From the perspectives of entrepreneurship higher education, teacher creativity plays an essential role in stimulating students' curiosity, which is essential for entrepreneurial aspirations and innovative activities (Jeffrey & Craft, 2004; Zhou & Luo, 2012). Hamidi et al. (2008) also concluded that student inventiveness is a significant factor that will determine their future entrepreneurial career while Samuel and Rahman (2018) opined that it is high time teachers are more innovative in their approach to teaching entrepreneurial content to achieve desired outcome. However, previous studies (e.g., Pihie, 2014; Wibowo et al., 2018) have not focused sufficiently on the relationship between teacher creativity and student curiosity in Pakistan's vocational settings. Entrepreneurship education influences the attitude, behaviours and mindsets of entrepreneurs (Ahmed et al., 2020; Wardana et al., 2020). It works in two basic capacities: knowledge dissemination and capability development (Wu & Wu, 2008). Soutaris et al. (2007) suggest that the education on entrepreneurship affects the intentions to become an entrepreneur through the acquisition of knowledge, through inspiration and through the use of resources. Students create social networks, get feedback from peers and faculty, and get confident to become entrepreneurs. A number of studies confirm that entrepreneurship education has a considerable impact on future entrepreneurial intentions (Fayolle & Gailly, 2015; Piperopoulos & Dimov, 2015; Karimi, 2016). However, Saptono et al. (2020) cite the need for a more comprehensive implementation and integration of entrepreneurship education that can be reached in both public and private schools. Inspiration, ideation, and implementation are three interlocking stages of design thinking that were popularised from IDEO in the 1990s (Brown, 2009). The idea has evolved from earlier research: Archer (1979) identified a 'designerly mode of thought' different from the scientific or scholastic approach; Simon (1969) introduced a design method for solving problems which were ill-structured. The Brown's model has been applied in other fields beyond product design, such as management, education and entrepreneurship (Brown 2009). It focuses on problem-solving and an iterative approach, with the user at the centre of the process, reflecting very strongly the qualities of successful entrepreneurs who are driven by questioning and opportunity seeking (Owen, 1998; Buchanan, 1992). In the 4th Industrial Age, curiosity is seen as a multi-dimensional concept that involves cognitive, emotional, and psychomotor dimensions (Huang et al., 2020). According to Sudjarwo et al. (2019), curiosity is a spontaneous pattern of thinking that is innovative which serves as a basis for creating innovations. Perry-Smith and Mannucci (2017) consider two types of curiosity, idea generation, and innovation, application and execution, and argue that the former is necessarily a precursor to entrepreneurial action. In addition, Runco and Pritzker (2020) find that curiosity correlates with entrepreneurial opportunities for students.

2.5 Theoretical Framework

The following three complementary theory perspectives are used for the present study, which explain the mechanisms by which teacher creativity changes into student curiosity through entrepreneurship education and designing thinking.



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2.5.1 Self-Determination Theory (SDT)

The theory of self-Determination theory (Deci and Ryan, 1985, 2000) suggests the three primary psychological needs of humans are to be autonomous, competent, and related. If such needs are met in the school setting, students will be more intrinsically motivated, curious and creative in their behaviour. Creativity as a teacher's instrument is a powerful engine of curiosity among students in the context of entrepreneurship education, SDT gives an interesting explanation. Creative teachers, who use flexible and student-centred teaching strategies, cultivate students' autonomy and independence, encouraging students to explore problems independently, to take intellectual risks, and to gain confidence in their business. Competence needs are met in the design of entrepreneurship courses that offer tasks that are challenging but achievable, and that increase in self-efficacy along the way. The relatedness is ensured by the collaboration among peers and mentoring from faculty teachers as part of programmatic experiential entrepreneurship. Vansteenkiste, Ryan, and Soenens (2020) have further developed SDT by showing that need satisfaction is not simply a predictor of academic performance, but has a fundamental impact on the quality of learning engagement. In a context in which creative pedagogy is transformative, it is evident that it is particularly transformative to applied on the Pakistani context where the rigidity and rote learning is prevalent. In recent years, SDT has been applied in several ways to research the effect of entrepreneurship education on increasing student motivation and curiosity in addition to traditional incentives provided in the classroom (Khalil et al., 2024; Tsou, Steel, & Osiyevskyy, 2023), providing direct theoretical support for the mediation model that was proposed in the present study.

2.5.2 Social Cognitive Theory (SCT)

Bandura (1986) Social Cognitive Theory (SCT) states that learning is an active, interactive process that requires a dynamic, reciprocal relationship between personal cognition, behaviour and environment. Self-efficacy is an important concept in SCT, which is defined as a person's confidence in their ability to execute specific behaviors effectively. The entrepreneurial self-efficacy and thus entrepreneurial curiosity of the learner is shaped in entrepreneurship education research by observing and interacting with entrepreneurial teachers as exemplars of SCT. Teachers who demonstrate creative problem solving and entrepreneurial thinking are powerful vicarious learning stimuli, as students observe, internalize, and emulate them.

The role of mediation of entrepreneurship education is also embedded in this study as the SCT. As students repeatedly encounter entrepreneurial knowledge and relationships with peers, as well as experiential tasks, through structured educational programmes, they gradually develop higher levels of self-efficacy and intrinsic motivation to engage in entrepreneurial activities. This is consistent with the findings presented by Anwar et al. (2023) that the knowledge and abilities of the learners can be brought to life in a socially mediated learning process and so can be their desire to become entrepreneurs. At a business school in Pakistan, SCT highlights the key role of the teacher-student relationship as the key medium by which entrepreneurial orientations are best conveyed.

2.5.3 Componential Theory of Creativity (CTC)

According to Componential Theory of Creativity (CTC) from Amabile's (1983, 1996), creative achievement is the result of the collaboration of three components: domain-relevant skills, creativity-relevant processes (including risk taking, curiosity, and divergent thinking), and intrinsic task motivation. The theory is especially pertinent to this study because it brings the issue of curiosity, as a creativity-relevant process, into the dialogue with the inputs in instruction and the outputs of entrepreneurship. When teachers use instructional strategies that are rich in creativity, they directly activate the processes in students that are relevant to creativity, such as epistemic curiosity, openness to experience, and tolerance for ambiguity, according to CTC. These are just the attitudes that good entrepreneurship education can further develop and direct towards entrepreneurial intention and action. Theoretically, the role of design thinking as a moderating influence is also provided by CTC. Inspiration, ideation, and implementation in Brown's (2009) design thinking model align closely to the processes relevant to creativity as seen in CTC: Inspiration is related to curiosity, ideation is related to divergent thinking, and implementation is related to domain-relevant skills. Zhou and Hoever (2023) show that the connection between intrinsic motivation and concrete outcomes of creativity and entrepreneurship is strongly enhanced, when structured creativity enhancing pedagogies are applied, like design thinking. The three theories, SDT, SCT, and CTC, collectively form a strong theoretical framework and place teacher creativity, entrepreneurship education and design thinking as institutional conditions that are most conducive to fostering student curiosity and entrepreneurial inclination in secondary and Higher educational settings in Pakistan. Since then, a significant body of empirical and conceptual scholarship on the topics of entrepreneurship education, teacher creativity, design thinking and student curiosity has emerged, providing strong support for the propositions presented in this study.



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The intent-behavior models for entrepreneurship education displayed a mediating architecture between the intention and the behavior, which is relevant for the topic. Four themes of recent publications are of particular relevance: (a) entrepreneurship education as a transformative, curiosity-activating process, (b) teacher creativity and innovative pedagogical practices, (c) design thinking as a new paradigm in education, and (d) the mediating architecture of entrepreneurship education in intent-behavior models.

2.6 Entrepreneurship Education as a Transformative and Curiosity-Activating Process

One of the key concepts of the last decade of research is that of shifting the focus of entrepreneurship education from a knowledge delivery system to an active, transformative process. In this study, Koe, Krishnan, and Marmaya (2024) show that individual entrepreneurial orientation is a strong mediator of the relationship between student involvement and entrepreneurial intention, and that students' involvement in entrepreneurship learning activities is consistently positively associated with entrepreneurial intention, using an online engagement model. This was also supported by a large-scale systematic review conducted by Ramírez-Saltos et al. (2023) on entrepreneurship education, which found that a transformative approach to entrepreneurship education is essential to achieve lasting changes in the mindset and curiosity of students, and that experiential and project-based learning approaches, as well as approaches that involve the community, are the most effective with respect to this. In a study of public universities in Nigeria, Madugu, Kawu, and Jimoh (2023) found that the influence of entrepreneurship education on innovation and creativity of university students is statistically significant and has a greater impact when university curricula are linked with practical challenges of an enterprise. In addition, Mahmudin (2023) places entrepreneurship education in the context of problems in the global economy, which is quite close to the central thesis of the current study, that preparing the youth to deal with volatility and ambiguity is indeed closely related to entrepreneurship education. In the specific context of South Asia, Anwar et al. (2023) confirm that SE encourages students in Pakistan to be creative and find opportunities for their business, but they fail to map out the psychological pathways by which these benefits are attained, which is what the present study seeks to do for Pakistan specifically.

The creation of entrepreneurial ecosystems in the universities is an important theme for the development of infrastructure in higher education. Recent studies by Van der Westhuizen (2023, 2024) have shown that the design thinking practices embedded in youth entrepreneurship support networks significantly increase students' ability to explore other futures and develop new solutions, which is particularly relevant to contexts in Pakistan. Likewise, Amaral et al., (2024) and Chang et al., (2025) both claim that education can only be entrepreneurially transformative if it also builds psychological assets like resilience, empathy, and tolerance for uncertainty in addition to the technical business skills.

2.6.2 Teacher Creativity and Innovative Pedagogical Practices

More recent research confirms that teacher creativity and instructional innovation are key constructs in entrepreneurial learning. Kim (2025) finds that inquiry-based and technology-integrated teaching, and learner-centred teaching, are the three most distinctive characteristics of innovative approaches in entrepreneurship education; moreover, the teaching of learner-centred pedagogy has the strongest relationship to entrepreneurial orientation and student curiosity. The theoretical hypothesis of this present study that teacher creative thinking is the strongest factor affecting student curiosity ($\beta = 0.709$) is in line with this finding. The systematic review of creativity and innovation research conducted by Zhou and Hoever (2023) lists teacher-level and instructional design variables as being of equal importance in affecting student creative behaviour as well as individual personality traits. The present study's argument to include teacher creativity development in the educational policy agenda is supported by their meta analytic model because it also argues that teacher creativity should be the focus of learning, not exclusively students' level interventions. In the context of vocational high schools in Indonesia, a sociocultural environment that shares several similarities with the context of this study, Supandi and Burhanudin (2024) also show that in the vocational high school context, the relationship between the instructional quality and entrepreneurial motivation and innovation of students is mediated by entrepreneurship education, thus providing direct comparative validation for the mediation model tested in this study. Notably, since 2023, researchers are interested in the new areas where AI and teacher creativity intersect in entrepreneurship education. A review by Kim et al. (2025) of the use of LLM in Entrepreneurship Education also found that AI-supported creative pedagogies have the potential to enrich teachers' instructional toolkits, thereby potentially increasing student curiosity. However, the benefits of using AI tools are dependent on teachers having a minimum of the creative abilities to fully leverage AI tools, highlighting the centrality of teacher creativity development promoted in the present paper.

2.6.3 Design Thinking as an Emergent Educational Paradigm



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Conducting a systematic literature review on design thinking in education over the past decade (2014–2024) shows that the number of publications has increased significantly between 2023 and 2024, and that it is increasingly recognized as a tool for cultivating twenty-first-century skills such as creativity, empathy, and entrepreneurial problem-solving (Liu, 2023). The review also points to Asia as the top contributor to DT education research, thereby reaffirming the significance of making DT 'explicit' in the entrepreneurship curriculum in South Asian countries, including Pakistan. To be effective as an entrepreneurship teaching methodology, design thinking must be grounded in a solid education philosophy, as emphasised by Schneider et al. (2023). One of the issues they raise concerns the use of design thinking as a toolkit for procedures without any pedagogical purpose, which is what the present study partly aims to address by focusing design thinking in an SEM-PLS framework which contains teacher creativity and entrepreneurship education. Ilyas, Kansikas, and Fayolle (2024) further argue that design thinking is well suited to rethinking the way students think about problems – shifting from closed technical thinking to open, opportunity-driven thinking, that is entrepreneurial. The results of their study support the characterisation of design thinking as a meaningful independent predictor of student curiosity that is observed in the present study.

A novel empirical study conducted by Kilinc and Karabudak (2024) in engineering design-based STEM activities in elementary schools of Turkey shows that structured design cycles can enhance students' entrepreneurship and problem-solving abilities in a meaningful way even as early as in the 4th grade, supporting the argument of the present study that the impact of DT on curiosity is not limited to higher education and can be especially powerful when implemented during formative years of schooling. Moreover, Fei and Liu (2023) and Razzaque et al. (2024) show that incorporating data-driven, inquiry-focused learning into design projects enhances both analytical depth and entrepreneurial decision making, thereby making design thinking a catalyst for systemic entrepreneurial action and creativity.

2.6.4 Mediation Architecture of Entrepreneurship Education and Emerging Gaps

Since 2023, there have been increasing examples of empirical research that examine the mediating role of entrepreneurship education in intention and creativity models. The results of this study in the context of UAE university students also support the full mediating role of entrepreneurship education between individual entrepreneurial orientation and entrepreneurial intention, in line with the findings of Khalil et al. (2024) who also found that entrepreneurship education is a full mediator between individual entrepreneurial orientation and entrepreneurial intention, indicating that entrepreneurship education does not directly produce entrepreneurial intention alone, but rather strengthens and focuses existing psychological resources to lead them to the entrepreneurial goal. This result is very similar to the mediation result reported in the present study (H4: $t = 2.611$, $p = 0.006$) in which the relationship between teacher creativity and student curiosity was mediated by entrepreneurship education.

Fridi et al. (2025) and Krivokucha et al. (2024) provide a full mediation model that supports entrepreneurship education as a catalyst that links internal psychological resources (mindset, self-efficacy, and creativity) with actionable entrepreneurial goals in a post-COVID-19 study of entrepreneurial intentions. These results bring the idea of entrepreneurship education to the fore as a means of reinforcing existing motivational predispositions, thereby echoing the idea that comes from Soutaris et al. (2007) that entrepreneurship education is an inspirational amplifier of motivational dispositions, and adding to it during the post-pandemic time frame with fresh empirical evidence. In a thorough meta-analytic review of 27 studies, Tsou, Steel, and Osiyevskyy (2023) conclude that pedagogical quality, and in particular teacher creativity, in entrepreneurship education is a key policy lever in the relationship between entrepreneurial intention and subsequent entrepreneurial behaviour. Yet there are still many areas where there is a lack of evidence. The vast majority of post-2023 studies take place in East Asian, European or Middle Eastern settings and there is significant underrepresentation of South Asian, particularly Pakistani, entrepreneurship education. Additionally, there is no study in Pakistan that has tested the specific triadic relationship of teacher creativity, entrepreneurship education (as mediator) and design thinking (as predictor) of student curiosity in Pakistan, which makes the current paper unique and timely as well. The recent literature therefore confirms the uniqueness and necessity of the integrated model proposed in this study, as well as the individual constructs and relationships being studied.

3. Research Framework, Questions & Hypotheses

The study suggests that the influence of teacher creative thinking (TC) on students' curiosity (C) is mediated through the entrepreneurship education (EE), and that this influence is amplified. It is theorized that design thinking (DT) is one more predictor of curiosity.

The conceptual model is shown in the following: $TC \rightarrow EE \rightarrow C$, where there is an extra path $DT \rightarrow C$.

Research Questions



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RQ1: Whether teachers' creative thinking significantly affects students' curiosity quotient (CQ) or not.

RQ2: What is the impact of design thinking on students' curiosity?

RQ3: How much does design thinking impact students' curiosity?

RQ4: How does entrepreneurial education mediate the influence of teachers' creativity on students' curiosity?

Hypotheses

H1: There is a positive relationship between teachers' creative thinking and students' curiosity quotient.

H2: Design Thinking has a positive impact on students' curiosity.

H3: Design Thinking has a significant effect on students' curiosity (Statistically).

H4: Creativity of teachers significantly influences the curiosity of students through the education of entrepreneurship.

4. Methodology

A survey design that utilized a cross sectional approach with a quantitative method was used. This study explored three types of variables: teachers' creative thinking (exogenous), entrepreneurship education (intervening mediator), and students' curiosity (endogenous). The data was gathered from August to October 2022 from the Government business schools located in Hyderabad, Sindh (a chosen city for its relatively high quality of education in this region). The purposive sampling method was used to select the samples based on the suggestions of Hair et al. (2020) for non-probability sampling. A total of 400 questionnaires were distributed and 375 were used in the analysis. The age of the respondents ranged from 15 to 17 years and the majority of them were females, who included students from different majors such as Business, Accounting, Office Management and Automobile. About half had parents who were self-employed. Items from validated instruments were adapted to suit the teachers' creativity, entrepreneurship education and student curiosity, namely seven items from Ayob et al. (2013) and Dobbins (2009), six items from Opoku-Antwi et al. (2012) and Denanyoh et al. (2015), and eight items from Zhou and George (2001), respectively. Each item was measured using a five-point Likert Scale (1 strongly disagree to 5 strongly agree). The main analytical tool was Structural Equation Modelling – Partial Least Squares (SEM-PLS) and SmartPLS 3.0 was used. The study was approved by ethics board of the Regional authority, Sindh.

5. Results

5.1 Measurement Model (Outer Model)

Convergent validity was determined with the help of factor loadings and Average Variance Extracted (AVE). The loading of all indicators were in the range of 0.620 to 0.867. One indicator (C3 = 0.65) was removed per Hair et al. (2020) guidance (loading < 0.70). The AVE values were between 0.569 and 0.672 (all > 0.50), indicating convergent validity. Composite Reliability (CR) and Cronbach's Alpha exceeded 0.70 for all constructs: TC (CR = 0.940, α = 0.929), EE (CR = 0.915, α = 0.910), and C (CR = 0.921, α = 0.870).

Table 1: Discriminant Validity (HTMT Criterion)

Construct	TC	EE	C
Teachers' Creativity (TC)	0.821		
Entrepreneurship Education (EE)	0.706	0.820	
Students' Curiosity (C)	0.774	0.726	0.755
Design Thinking (DT)	0.754	0.810	0.760

Discriminant validity was confirmed; all diagonal values (square root of AVE) exceeded inter-construct correlations. VIF values were below 5.00, ruling out collinearity concerns.

5.2 Structural Model — Hypothesis Testing

H	Relationship	β	t-value	p-value	Decision
H1	TC \rightarrow C	0.709	30.400	0.001	Supported
H2	DT \rightarrow C	0.364	6.840	0.001	Supported
H3	DT \rightarrow C (significance)	0.220	1.914	0.006	Supported
H4	TC \rightarrow EE \rightarrow C (mediation)	—	2.611	0.006	Supported

The four hypotheses are accepted in the 5% level of significance. TC is the most significant driver of student curiosity, with contribution to the curiosity of students in the amount of $\beta = 0.709$ for H2 and $\beta = 0.220$ for the significance path H3. DT contributes to the curiosity of students, but it is not as significant as TC, with contribution of $\beta = 0.364$ for H2 and $\beta = 0.220$ for the significance path H3. The mediation path (H4) supports the notion that the entrepreneurship education is an important mechanism by which the creativity of teachers leads to increased student curiosity.

5.3 Model Fit Indices

Students' curiosity had a moderate predictive power (R^2 value 0.291) while the R^2 value for design thinking was 0.50. All endogenous constructs had values of Q^2 higher than zero, indicating that the model has predictive relevance. The effect size (f^2) for TC on EE was 1.01 (large) and EE and C together had effect size $f^2 = 0.093$ (small-to-moderate) on curiosity of students.

6. Discussion

The findings showed that teacher creative thinking has the strongest direct effect on student's curiosity ($\beta = 0.709$; $t = 30.400$; $p < 0.001$). These findings support the notion of Hamidi et al. (2008) and Zampetakis et al. (2011) who state that curiosity and creativity are essential entrepreneurial abilities. Creative teachers encourage their students to think creatively, which is necessary in a competitive business world where being creative is a key competitive edge. The mediation role of entrepreneurship education (H4: $t = 2.611$, $p = 0.006$) supports the theoretical proposition of Soutaris et al. (2007) that the effects of knowledge acquisition, inspiration and networking for resources together strengthen entrepreneurial intent. Education is an orderly channel that leads teachers' creativity to sustained curiosity and entrepreneurial orientation of students. Design thinking has an independent but lesser impact on curiosity (H2: $\beta = 0.364$; H3: $\beta = 0.220$). Inspiration–ideation–implementation (I-I-I) process set forth by Brown (2009) seems to be well suited to complement curiosity development, as it offers structured problem-solving processes that are human centered and scaffold open-ended inquiry. This is a novel finding in the



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literature of business schools in Pakistan which calls for further study. This study is significantly different from previous research in that it examines how teacher-level and pedagogical-design variables influence entrepreneurial intentions along with gender, culture, or self-efficacy. This has direct policy implications: teacher development programmes should make creativity and design thinking an essential, not an optional, part of teacher professional skills.

7. Conclusion & Implications

The relationship between teachers' creativity and students' curiosity was explored in Pakistani government business schools with the mediation of entrepreneurship education and the addition of design thinking as a mediator. All four hypotheses were supported with teacher creativity being the most important factor in the development of student curiosity ($\beta = 0.709$), and the entrepreneurship education found to be a significant mediating variable. For practitioners, the results indicate that school administrators and policymakers need to: (1) invest in the enhancement of teacher's creativity by teaching, sharing ideas with other teachers, and reflecting on their own work; (2) revise entrepreneurship education curricula and make DT an explicit pedagogical component; (3) create partnerships between industry and school to give students experiential entrepreneurship exposure; and (4) expand the body of evidence with private schools and other constructs, including self-efficacy and entrepreneurial attitude. There are limitations that are inherent in the study, as it focuses on government business schools in the city of Hyderabad as well as on four constructs. For future studies, geographical and institutional scope of studies should be expanded, longitudinal studies should be used to follow up the issue of curiosity over time, and specific mechanisms for how design thinking can spur entrepreneurial curiosity should be explored. To sum up, teacher creativity (enhanced by entrepreneurship education and design thinking) can be a great institutional tool to foster student curiosity and in the process, nurture the entrepreneurial future of Pakistan.

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