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Exploring the Relationship among Various Forms of Social Support, Academic Engagement, and Technology Anxiety amidst the COVID-19 Pandemic: An investigation of mediation and moderation effects

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ABSTRACT

Background and Objectives: The central objective of the educational system is to cultivate student success, promote academic progress, and foster meaningful and enjoyable learning experiences. Achieving these aims hinges significantly on student engagement in the learning process, as its absence may lead to academic failure and suboptimal outcomes. Numerous factors influence students' academic engagement quantity and quality, warranting thorough investigation. This need has been accentuated by the widespread implementation of virtual education during the COVID-19 pandemic, which has been associated with declining academic performance and reduced interest in learning among students. In response to this challenge, examining the factors that impact academic engagement, including the support provided by teachers, parents, and classmates, and integrating new technologies that have become integral to the educational landscape is essential. However, utilizing these new technologies also brings unique challenges, notably technology anxiety, wherein students may experience fear and apprehension when confronted with technology-related tasks. The present research explores the relationship between the type of social support and learners' level of academic engagement, considering the mediating and moderating role of technology anxiety. By elucidating such relationships, this study aims to propose innovative and contemporary solutions that effectively harness social support, ultimately ensuring educational success and fostering positive learning experiences amidst the complexities of modern education.

Materials and Methods: The research adopted a quantitative and survey-correlation methodology. The statistical population comprises 528 eighth-grade high school students (264 girls and 264 boys) from Famnin City during the academic year 2021-2022. Initially determined as 225 individuals using Karajesi and Morgan's table and selected through random cluster sampling, the sample size was later increased to 402 participants (221 girls and 181 boys) to enhance generalizability. The research instruments consist of Reeve's 2013 Academic Engagement Questionnaire, Dimrai and Maleki's 2002 Social Support Questionnaire, and Bandalos and Benson's 1990 Computer Anxiety Questionnaire. Convergent and divergent validity assessed the items' validity, while Cronbach's alpha, combined reliability, and Spearman's tests measured item reliability. The presented model and results were analyzed using structural equations and Spearman's correlation test.

Findings: The findings from the structural equations analysis indicate a significant relationship between social support and the extent of student academic engagement mediated by technology anxiety. The social support provided by parents, teachers, and classmates exhibits both direct and indirect effects on students' academic engagement. This support, comprising instrumental, informational, emotional, and evaluative aspects, positively influences students' engagement in various technological aspects, including communication, work success, confidence, and intimacy. Consequently, technology anxiety is reduced, increasing academic engagement across behavioral, cognitive, emotional, and causal dimensions. Furthermore, this positive effect remains evident even when not considering technology anxiety as a mediating factor.

Conclusions: The research findings highlight the crucial and fundamental role of parents, teachers, and classmates in addressing students' challenges, particularly in the realm of technology and its application in education. These key stakeholders can provide essential support to students, facilitating the resolution of technological issues. Recognizing their significant impact, policymakers and educational authorities should harness these valuable resources to enhance the quality of online education. Implementing targeted programs and plans to encourage parents, teachers, and classmates to offer increased social support will ultimately improve the overall learning experience and academic engagement.

NUMBER OF REFERENCES
68

NUMBER OF FIGURES
2

NUMBER OF TABLES
15

مقاله پژوهشی

بررســی رابطه‌ی بین انواع حمایت اجتماعی بـا درگیرسـازی تحصـیلی از طریق نقش میانجی و تعدیل‌کنندگی اضطراب فناوری طی دوره کرونا

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چکیده

پیشینه و اهداف: تمام تلاش‌های نظام آموزشی در راستای موفقیت، پیشرفت تحصیلی و ایجاد یادگیری‌های عمیق و لذت بخش در دانش‌آموزان اسـت. این امر بدون درگیر شـدن دانش‌آموزان در فرآیند یادگیری امری غیرممکن اسـت که نتیجه‌ای جز شکست و عدم موفقیت در پی نخواهد داشت. اما کمّیت و کیفیت درگیری تحصیلی دانش‌آموزان متأثر از عوامل گوناگون و مختلفی است که توجه و بررسی آن ها امری لازم و ضروری است. چنین ضرورتی با شیوع کووید ۱۹ و آغاز آموزش‌های مجازی که همراه با افت تحصـیلی و عدم علاقه و لذت یادگیری در دانش‌آموزان بود بیش از گذشـته آشکار شد. با بررسی و مطالعه عوامل تاثیرگذار بر درگیری تحصیلی می‌توان به حمایت معلمان، والدین و همکلاسی‌ها و همچنین فناوری‌های نوینی که امروزه جز جدایی ناپذیر جریان آموزش شـده‌اند اشـاره کرد که قادر هسـتند باعث ارتقا کمی و کیفی درگیری تحصـیلی شـوند؛ اما اسـتفاده از فناوری‌ها نیز، چالش‌های پیش روی خود را دارا بود. یکی از این چالش‌ها اضطراب فناوری بود. زمانی که دانش‌آموزان هنگام مواجه با فناوری‌ها، دچار اضطراب و ترس می‌شـدند و لزوم حل چنین مشـکلی اجتناب ناپذیر بود. لذا این پژوهش با هدف بررسـی رابطه‌ی بین حمایت اجتماعی با میزان درگیرسازی یادگیرنده با نقش تعدیل‌گری و میانجی اضطراب فناوری انجام شد تا راهکارهای متفاوت و بروزی را ارائه کند که در چنین شـرایطی نیز حمایت‌های اجتماعی اثرگذار باشـند و در نتیجه شـاهد موفقیت امر آموزش و یادگیری باشیم.

روش‌ها: روش پژوهش کمّی و از نوع پیمایشی- همبستگی بود. جامعه آماری این پژوهش شامل ۵۲۸ نفر (۲۶۴ دختر و ۲۶۴ پسر) دانش آموزان پایه هشتم متوسطه شهرستان فامنین بود که در سـال تحصیلی ۱۴۰۱-۱۴۰۰ مشـغول به تحصیل بودند. حجم نمونه بر اساس جدول کرجسی و مورگان ۲۲۵ نفر و به روش خوشه‌ای تصادفی انتخاب گردید، اما به دلیل اطمینان بیشـتر این نمونه به ۴۰۲ نفر (۲۲۱ دختر و۱۸۱ پسر) تغییر یافت. ابزارهای پژوهش شامل پرسشنامه درگیرسازی تحصیلی ریو ۲۰۱۳، پرسـشنامه حمایت اجتماعی دیمرای و مالکی ۲۰۰۲ و پرسـشنامه‌ی اضطراب رایانه باندالوس و بنسـون ۱۹۹۰ بود. روایی ابزارهای پژوهش بر اسـاس روایی همگرا و واگرا موردسـنجش قرار گرفت. پایایی ابزارها نیز بر اساس آزمون آلفای کرونباخ، آزمون پایایی ترکیبی و آزمون اسپیرمن موردسنجش قرار گرفت و مدل ارائه شده و نتایج حاصل از طریق معادلات ساختاری و آزمون همبستگی اسپیرمن مورد بررسی قرار گرفت.

یافته‌ها: نتایج معادلات ساختاری نشان داد که بین حمایت اجتماعی با میزان درگیرسازی تحصیلی یادگیرنده با نقش میانجی اضطراب فناوری رابطه معناداری وجود دارد و حمایت اجتماعی والدین، معلمان و همکلاسـی‌ها نیز به صـورت مسـتقیم و غیرمسـتقیم بر درگیرسـازی تحصیلی دانش‌آموزان تاثیرگذار اسـت. حمایت اجتماعی والدین، معلمان و همکلاسـی‌ها که به صـورت حمایت‌های ابزاری، اطلاعاتی، عاطفی و ارزیابی ارائه شـدند در سـه بخش ارتباط دهی با فناوری، موفقیت کار در فناوری و اطمینان و صـمیمت در فناوری موجب کاهش اضـطراب فناوری و افزایش درگیری تحصـیلی دانش‌آموزان در چهار بعد درگیری رفتاری، شـناختی، عاطفی و عاملی شـد. همچنین این تاثیر به صـورت مستقیم و بدون در نظر گرفتن اضطراب فناوری نیز صادق بود.

نتیجه‌گیری: با توجه به نتایج پژوهش والدین، معلمان و همکلاسـی‌ها با ارائه حمایت‌های لازم می‌توانند در حل مشکلات و چالش‌های پیش روی دانش‌آموزان نقشی مهم و اساسی ایفا کنند. به ویژه اگر این مشکلات و چالش‌ها در

حوزه فناوری و کاربرد و استفاده آن در امر آموزش باشد. به همین دلیل سیاستگزاران و مسئولان آموزش و پرورش برای ارتقا کیفیت آموزش‌های مجازی نباید از این ظرفیت‌های بزرگ چشـم پوشـی کنند و با برنامه‌ها و طرح‌های لازم موجب تشـویق والدین، معلمان و همکلاسـی‌ها دانش‌آموزان گردند تا به ارائه حمایت‌های اجتماعی بیشـتر روی آورند و کیفیت آموزش و یادگیری را بهبود بخشند.

Introduction

Over the past few decades, empirical research has consistently demonstrated that academic engagement plays a crucial role in shaping students' learning outcomes, academic progress, success, and overall retention rates, ultimately contributing to the enhancement of educational quality [1-4]. The outbreak of the Coronavirus pandemic further emphasized the significance of academic engagement as conventional pedagogical approaches rapidly transitioned to virtual instruction, leading to a profound transformation in the educational landscape. This abrupt shift placed students in an uncharted learning environment heavily reliant on new educational technologies as a fundamental prerequisite for their scholastic endeavors. Despite initial expectations of positive outcomes, this transition gradually resulted in declining interest and decreased participation in academic activities and homework completion, necessitating renewed efforts to fortify students' cognitive engagement [5].

Academic Engagement encompasses several facets that reflect students' emotional, cognitive, and behavioral involvement in their learning activities and homework [6]. This active participation is characterized by a high level of mental energy and mental activity, leading to sustained effort and a sense of enjoyment throughout the learning process, making time feel inconsequential [7]. *The cognitive engagement* involves students' self-regulated learning, the use of advanced learning strategies, and persistent efforts to grasp complex concepts [8]. *Emotional*

engagement encompasses both positive emotions, such as interest, happiness, and joy, as well as negative emotions, including stress, anxiety, sadness, discomfort, and shame, concerning schooling and the learning process [8]. *Behavioral Engagement* is observable through actions such as students' commitment, attentiveness to teachers, active classroom participation, and timely homework completion [6] [8-10]. Reeve and Tseng [11] also introduced a fourth dimension known as '*agentive engagement,*' which underscores students' active involvement in determining the learning content and shaping the learning environment [12]. Learning technologies are pivotal in engaging students academically through diverse design strategies [66&67]. However, their utilization often triggers learner anxiety toward technology [68]. It necessitates employing various forms of social support to manage and regulate this aspect effectively [42&43].

Many studies have been done in the field of managing technology anxiety through social support [40&43]. Still, uncertainties persist regarding the distinct roles played by parents, teachers, and classmates in delivering social support to mitigate technology anxiety. It remains unclear whether all of these sources impact technology anxiety or if only certain ones are influential. To assess the effectiveness of social support in reducing technology anxiety, a comprehensive investigation into its delivery methods and underlying mechanisms is imperative. Moreover, the study examines whether technology anxiety operates as a mediating or moderating factor in the relationship between social support and

academic engagement. Understanding the nature and dimensions of this effect is critical. Thus, this research seeks to address these gaps in knowledge and unveil the intricate connections between social support, academic engagement, and technology anxiety within the educational technology context, specifically focusing on their implications for student well-being and learning outcomes. As a result, the following research questions are formulated:

Q 1. To what extent does technology anxiety mediate the relationship between social support and the academic engagement levels of learners?

Q 2. To what degree is there a statistically significant relationship between the social support provided by teachers and the academic engagement levels exhibited by students?

Q 3. To what extent is a statistically significant relationship between parental social support and students' academic engagement levels?

Q 4. To what degree is there a statistically significant relationship between the social support received from classmates and the academic engagement levels demonstrated by students?

Q 5. To what extent does technology anxiety act as a moderating factor in the relationship between social support and the academic engagement levels of learners?

Review of the Related Literature

Numerous factors, including environmental influences, significantly impact learners' academic engagement quantity and quality. Drawing inspiration from Bronfenbrenner's ecological system theory [13], we understand that learners are intricately shaped by their surroundings. Key components of this environment, such as family, teachers, friends, and classmates, play pivotal roles as proximal

and influential factors. This network of individuals can considerably influence academic engagement by providing various support forms [14-15]. These supportive measures are commonly referred to as 'social support' and have been the subject of extensive investigation, particularly in the context of academic engagement. The relationship between social support and academic engagement has been a focal point in numerous studies, underscoring its critical role in shaping learners' educational experiences.

Social support represents a connected network of relationships that aids individuals in dealing with challenges and stressful situations by offering both material and psychological resources [16]. In the realm of educational technology, social support encompasses communication and interactions between learners and various key figures, including family members, friends, teachers, and peers. These interactions lead to exchanging information, knowledge, and practical problem-solving strategies for personal, work-related, and educational matters [17]. Extensive research has uncovered many benefits of social support in enhancing academic engagement. For instance, it has been shown to reduce stress levels [18-19], boost self-confidence, and nurture close and supportive relationships [20-21]. Additionally, social support has a positive impact on learners' perceptions of academic tasks and assignments, ultimately increasing their satisfaction with school [22]. Moreover, it aids in completing school assignments [23] and contributes to developing creative thinking skills [24]. These diverse dimensions of social support collectively contribute to its profound influence on nurturing and sustaining academic engagement among learners.

Social support, sourced from parents, teachers, classmates, and friends, takes various forms, including informational, instrumental,

emotional, and evaluative support. Each of these forms plays a pivotal role in promoting academic engagement. Information support involves the provision of advice, guidance, and essential information to help students address challenges and achieve their academic goals [25]. Instrumental support, on the other hand, encompasses tangible assistance by providing necessary facilities, equipment, and financial resources to support students' academic endeavors [16]. Emotional support involves feelings of love, affection, care, confidence, and respect, which are offered unconditionally and without discrimination. This type of support creates an encouraging and nurturing atmosphere [26]. Lastly, evaluation support pertains to receiving constructive feedback that enhances performance and refines approaches to various academic tasks [27]. Through these distinct dimensions, social support cultivates an environment that fosters students' academic engagement and overall success in their educational journey.

Technologies hold significant relevance in influencing academic engagement, with modern devices like mobile phones, computers, and tablets often serving to enhance and increase students' active participation in learning [28-31]. Through their potential to motivate and engage learners, technologies can accelerate skill development, enrich educational experiences, and foster connections between school learning and real-world practices [32]. Embracing technologies can lead to transformative changes in the educational landscape, bolstering teaching practices, facilitating school-world communication, and ultimately fostering greater student engagement in the learning process [33]. However, the prevalence of technology anxiety represents a notable barrier to the full utilization of available technologies. Technology anxiety encompasses negative

emotions such as distress, fear, restlessness, and discomfort experienced by users when interacting with digital devices like computers, mobile phones, and tablets [34-35]. Consequently, learners may avoid or limit technology usage due to fear and apprehension [36-37]. Providing comprehensive support from various sources is essential to mitigate technology anxiety, as it can empower learners to overcome their apprehensions and embrace technology more effectively [38-40]. In an efficient educational system, recognizing technologies as indispensable tools for engaging students and improving educational quality becomes not only a choice but a crucial necessity.

Salas et al. [41] conducted a study exploring the dynamics of teacher-student relationships, peer support, family support for learning, and school participation perceptions among both regular and special needs students. Their findings indicated a favorable level of these factors, with special needs students exhibiting higher levels of cognitive, emotional, and social engagement indicators than their typically developing peers. However, no significant differences were observed between the two groups in terms of behavioral indicators. Lee et al. [42] investigated the interplay between the quality of educational software (APP), computer anxiety, and students' engagement. Their research revealed that computer anxiety significantly influences the relationships between student participation, interface quality, and service quality, mediating the system's quality. Moreover, instructor quality directly mediated the relationship between computer anxiety and students' participation. Meanwhile, Zhou and Yu [43] examined the impact of social support on the well-being of Chinese students undergoing home quarantine during the COVID-19 pandemic. The study demonstrated a stronger positive association

between online learning self-efficacy and well-being in students who do not experience anxiety while quarantined at home. Additionally, Weinert et al. [40] found that social support positively affects end-user performance while simultaneously reducing technical fatigue and physiological arousal. Instrumental support was directly linked to end-user performance, technical burnout, and physiological arousal, while emotional support exclusively affected technical burnout. These empirical studies contribute valuable insights into the multifaceted relationships between educational technology, social support, academic engagement, and well-being among diverse student populations.

Based on prior research, this study sought to enhance current knowledge by examining how technology-related anxiety mediates and moderates the relationship between social support and learner engagement.

Method

The research adopted a quantitative and survey-correlation methodology, as it was necessary to analyze multiple variables within a complex process and study each of them separately.

Participants
The study encompassed the entire student population of Famenin City within Hamadan province, totaling 528 individuals (N=528). The research participants were selected using a random cluster sampling method, leading to a final sample size of 402 students (n=402), including 221 females and 181 males. The sampling process unfolded as follows: Initially, eight secondary schools, equally divided between male and female schools, were randomly chosen from the complete pool of second secondary schools, utilizing a random cluster sampling approach. Subsequently, in the following phase, three classes were randomly selected from each of the chosen schools.

The details of the participants are shown in Table 1.

The above table shows that 402 eighth-grade students of Famenin City participated in this research, 45% boys and 55% girls. Also, as seen in Table 1, most of the students are 14 years old, with a frequency of 71.1%, and 28.1% are 13 years old. On the other hand, 0.7% of the students did not answer the question correctly.

Instruments
Academic Engagement Questionnaire
The Academic Engagement Questionnaire by Rio was utilized to assess students' academic engagement. This questionnaire consists of 17 items and four subscales, namely causal, behavioral, cognitive, and emotional engagement, gauging the level of student engagement in academic matters.

Table 1: Characteristics of the participants

		Frequency	Percentage	Cumulative percentage
Age	13	113	28.1	28.1
	14	286	71.1	100
	No response	3	0.7	-
	Total	402		-
Gender	Male	181	45	
	Female	221	55	
	Total	402	100	

Participants responded on a seven-point Likert scale, ranging from completely disagree (1) to completely agree (7). Ramezani and Khamsan [44] examined the psychometric properties of the questionnaire in an Iranian context, reporting good construct validity and reliability using Cronbach's alpha for the entire questionnaire (α = 0.92) and its behavioral (α = 0.79), cognitive (α = 0.79), emotional (α = 0.87), and causal (α = 0.85) subscales.

Social Support Questionnaire

The CASSS2000 questionnaire developed by Maleki and Dimari [45] was employed to measure social support. This questionnaire comprises 60 items, assessing social support received from five sources: parents, teachers, classmates, close friends, and school parents. Each source's social support is measured using 12 items, encompassing four types of support: emotional, informational, evaluative, and instrumental. The scale was validated for the Iranian context by Khamsan and Abutalebi [46], with Cronbach's alpha calculated for each subscale. The obtained coefficients for the amount and importance of support in each subscale were as follows: parents (α = 0.89 and 0.81, respectively), teachers (α = 0.88 and 0.87, respectively), close friends (α = 0.90 and 0.86, respectively), classmates (α = 0.91 and 0.88, respectively), and other people (α = 0.93 and 0.92, respectively). Its validity was determined through factor analysis, which supported its construct validity.

Technology Anxiety Questionnaire

Bandalos and Benson's [47] computer anxiety scale, consisting of 23 items designed on a six-point scale (1 completely disagree to 6 completely agree), was adopted to measure technology anxiety. This scale assesses users' anxiety towards computers and can be reduced to three factors: communication with the computer (8 items), success in working with the computer (13 items), and trust and intimacy with the computer (9 items). The scale demonstrated high reliability with Cronbach's alpha values of 0.90, 0.90, 0.93, and 0.96 in a study with 375 subjects. Zaki [48] validated this questionnaire for the Iranian context, with modifications made in the current research to encompass technology anxiety. Alterations were made to the items, incorporating the words 'computer, mobile, and tablet' instead of solely "computer." to address the overlap between technology anxiety and computer anxiety.

Data Analysis

The data analysis method utilized a combination of descriptive and inferential statistics. Descriptive statistics involved calculating frequency, percentage, mean, and standard deviation, while inferential statistics included structural equation modeling and Spearman correlation. The Partial Least Squares (PLS, Version 4) software was employed for calculations and statistical analysis.

Ethics

Ethical approval was obtained to ensure the participation of these individuals in the study. Informed consent was obtained from all participants, signifying their voluntary agreement to be part of the research project. Furthermore, participants were assured that their personal information would be treated with strict confidentiality.

Results and Findings

Participants' Accessibility to Technology

Table 2 shows the frequency distribution of participants according to access to the type of technology. Based on the data presented in Table 2, the results indicate that the highest

frequency, accounting for 89.3% of the participants, corresponds to mobile access, signifying that most students possess mobile phones. Conversely, the lowest percentage of 3.5% is associated with students who lack access to any of the mentioned devices. Furthermore, the frequency of tablet access is 13.9%, suggesting that tablets are the least utilized among the student population. These results provide valuable insights into students' technological device preferences and usage patterns within the educational context.

Table 2: Frequency distribution of students based on the type of available technology

Technology Type in the access		Percentage	Frequency
Computer	Yes	22.6	91
	No	77.4	311
	Total	100	402
Mobile phone	Yes	89.3	359
	No	10.7	43
	Total	100	402
Tablet	Yes	13.9	56
	No	86.1	346
	Total	100	402
Laptop	Yes	14.4	58
	No	85.6	344
	Total	100	402
All of them	Yes	3.5	14
	No	96.5	388
	Total	100	402

Table 3 presents the findings, revealing that the social support variable exhibits the highest mean value, standing at 4.46. In contrast, the variable indicating technology anxiety records the lowest mean, with a value of 3.04. Furthermore, the mean score for student academic engagement stands at 4.44. Notably, social support and learner academic engagement variables display the lowest and highest levels of score dispersion, respectively.

Table 3: Central indices and dispersion of variables of social support, learner's academic engagement, and technology anxiety

Research variables	Mean	SD	Variances
Social support	1.858	1.363	4.46
Learner's academic engagement	3.055	1.747	4.44
Technology anxiety	2.322	1.523	3.04

In order to standardize the questions across the research dimensions, a confirmatory factor analysis test was employed. The results of this analysis, specifically the factor loadings for each questionnaire item, are presented in Table 4.

Table 4 displays the examination of factor loadings, with questions having factor loadings exceeding 0.7 retained in the external measurement model and validated. Conversely, questions with factor loadings below 0.7 are excluded from the final model. The research question is analyzed based on this finalized model. Notably, all research variables exhibit factor loadings exceeding 0.7, resulting in the retention of all questions in the measurement model.

Validity and Reliability

In terms of assessing convergent validity, the study also employed the Average Variance Extracted (AVE) test. The outcomes of this evaluation are presented in Table 5.

Table 4: Factor Loadings of Questions in the Research Measurement Model

Variable	Dimension	Question	Factor loading	Result	Variable	Dimension	Question	Factor loading	Result
Social Support	Social support of parents	1	.937	Confirmed	Learners Academic Engagement	Affective Engagement	1	.837	Confirmed
		2	.914	Confirmed			2	.787	Confirmed
		3	.933	Confirmed			3	.845	Confirmed
		4	.927	Confirmed			4	.841	Confirmed
		5	.928	Confirmed			5	.79	Confirmed
		6	.95	Confirmed		Behavioral Engagement	6	.853	Confirmed
		7	.931	Confirmed			7	.837	Confirmed
		8	.898	Confirmed			8	.816	Confirmed
		9	.853	Confirmed			9	.768	Confirmed
		10	.896	Confirmed			10	.77	Confirmed
		11	.942	Confirmed			11	.825	Confirmed
		12	.883	Confirmed		Cognitive Engagement	12	.88	Confirmed
		13	.911	Confirmed			13	.868	Confirmed
	Social support of teachers	14	.931	Confirmed			14	.845	Confirmed
		15	.899	Confirmed			15	.882	Confirmed
		16	.914	Confirmed			16	.839	Confirmed
		17	.91	Confirmed			17	.709	Confirmed
		18	.707	Confirmed	Technology anxiety	Contact with Technology	1	.891	Confirmed
		19	.746	Confirmed			2	.899	Confirmed
		20	.884	Confirmed			3	.882	Confirmed
		21	.727	Confirmed			4	.898	Confirmed
		22	.913	Confirmed			5	.871	Confirmed
		23	.734	Confirmed			6	.809	Confirmed
		24	.736	Confirmed			7	.889	Confirmed
		25	.764	Confirmed			8	.856	Confirmed
		26	.908	Confirmed			9	.9	Confirmed
		27	739	Confirmed			10	.865	Confirmed
	Social support of classmates	28	.94	Confirmed		Success in working with technology	11	.851	Confirmed
		29	.947	Confirmed			12	.805	Confirmed
		30	.93	Confirmed			13	.828	Confirmed
		31	.918	Confirmed			14	.777	Confirmed
		32	.921	Confirmed			15	.77	Confirmed
		33	.924	Confirmed			16	.858	Confirmed
		34	.907	Confirmed			17	.772	Confirmed
		35	.928	Confirmed		Trust and Intimacy with Technology	18	.867	Confirmed
		36	.868	Confirmed			19	.923	Confirmed
							20	.909	Confirmed
							21	.878	Confirmed
							22		Confirmed
							23		Confirmed

Table 5: Evaluation of Convergent Validity in the Measurement Model

Variable	AVE
Contact with technology	.766
Technology anxiety	.62
Trust and Intimacy with Technology	.726
social support	.612
Social support of teachers	.561

Variable	AVE
Social support of classmates	.728
Social support of parents	.841
Learners' Academic Engagement	.557
Behavioral conflict	.674
Cognitive conflict	.700
Emotional conflict	.614
Causal conflict	.686
Success in working with technology	.667

It is clear, the AEV was greater than 0.5 for all variables. Therefore, the convergence validity of the measurement model is confirmed. The results of divergent validity using the Fornell and Larcker test are also given in Table 6.

Based on Table 6, it can be said that the values on the main diameter, which are the root mean of the extracted variance, are more than the numbers of each row. Therefore, there is divergent validity between the variables. The reliability of the measurement model was measured based on Cronbach's alpha test, Composite reliability test, and Spearman test (according to Table 7).

Table 6: Investigating divergent validity in the research measurement model

	1 Contact with technology	2 Technology anxiety	3 Trust and intimacy with technology	4 social support	5 Social support of teachers	6 Social support of classmates	7 Social support of parents	8 Learners' Academic Engagement	9 Behavioral Engagement	10 Cognitive Engagement	11 Emotional Engagement	12 Agentive Engagement	13 Success in working with technology
1	.875												
2	.747	.787											
3	.735	.733	.852										
4	.725	.774	.661	.782									
5	.651	.691	.623	.715	.749								
6	.638	.683	.602	.827	.802	.854							
7	.717	.768	.625	.850	.811	.799	.917						
8	.712	.743	.607	.725	.623	.639	.733	.746					
9	.665	.700	.545	.685	.569	.598	.707	.738	.821				
10	.623	.648	.543	.629	.542	.555	.635	.81	.800	.837			
11	.638	.651	.527	.616	.547	.551	.605	.781	.769	.757	.784		
12	.666	.705	.599	.706	.614	.618	.713	.809	.809	.772	.728	.828	
13	.762	.756	.769	.755	.648	.655	.772	.726	.707	.621	.625	.683	.817

Table 7: Reliability check of the measurement model

Variable	Cronbach's alpha	Spearman test	Composite reliability test
Contact with technology	.956	.957	.963
Technology anxiety	.972	.973	.974
Trust and Intimacy with Technology	.940	.931	.922
social support	.981	.988	.977
Social support of teachers	.932	.972	.926
Social support of classmates	.968	.982	.961
Social support of parents	.984	.983	.983
Learners' Academic Engagement	.955	.953	.949
Behavioral conflict	.912	.88	.878
Cognitive conflict	.903	.861	.856
Emotional conflict	.860	.827	.778
Causal conflict	.897	.850	.847
Success in working with technology	.947	.942	.937

The quality of the measurement model using the Commuality Cros Vality (CV com) test of the shared index is given in Table 8.

Table 8: The quality of the research measurement model

Variable	Model	Result
social support	.557	Very strong
Learners' Academic Engagement	.475	Very strong
Technology anxiety	.555	Very strong

Each variable was assessed using three different values: 0.02 (indicating a weak measurement model quality), 0.15 (indicating a medium measurement model quality), and 0.35 (indicating a strong measurement model quality). The results indicated that the measurement models for the social support variables, learner's academic engagement, and technology anxiety exhibited a very strong level of quality.

Q 1. To what extent does technology anxiety mediate the relationship between social support and the academic engagement levels of learners?

The results of the structural equation analysis are presented in Table 9, examining the relationship between social support and the learner's degree of academic engagement, considering the mediating role of technology anxiety. It offers valuable insights into the complex interplay among these variables, shedding light on the potential impact of social support and technology anxiety on academic engagement within the context of educational technology.

Based on the data presented in Table 9, the t-values for the relationships under examination fall outside the range of 2.58 and -2.58, indicating that these relationships are statistically significant at a 99% confidence level. The beta coefficients reveal that social support has a direct positive effect of 37% on the learner's academic engagement. Furthermore, social support directly influences technology anxiety by 77%, and technology anxiety, in turn, negatively impacts the learner's academic engagement by 45%. Additionally, social support indirectly affects the learner's academic engagement by mediating technology anxiety, accounting for 17% of the total effect. Overall, the learner's academic engagement is simultaneously affected by social support directly and indirectly, representing a total effect of 54%, indicating that technology anxiety partially mediates. Consequently, it can be deduced that social support is significantly related to the learner's academic engagement, and this relationship is mediated by technology anxiety.

Furthermore, the Sobel test was employed to examine the mediating role of the technology anxiety variable. This test uses normal estimation to determine the significance of the relationship, testing the null hypothesis against the alternative hypothesis based on the estimate of the standard error of the indirect effect. The Z value obtained from the Sobel test is 8.09, with a standard deviation of 0.043, and the significance level is 0.001, which is less than 0.05. Consequently, at a confidence level of 95%, technology anxiety acts as a mediating variable between social support and the learner's academic engagement. Subsequently, the predictive power of the learner's academic engagement is assessed, and Table 10 examines its predictive capacity within the context of the first research question.

Table 9: The relationship between social support and learners' academic engagement with the mediating role of technology anxiety

Relationship	Path coefficient (beta)			SD	t-value	Sig	Result
	Direct effect	indirect effect	total effect				
social support on academic engagement	0.374	0.169	0.543	0.054	6.952	0.001	significant
social support on technology anxiety	0.774	-	-0.774	0.026	29.42	0.001	significant
technology anxiety on academic engagement	-0.454	-	-0.454	0.054	8.356	0.001	significant

Table 10: The predictive power of the criterion variable in the first research question

Predictor/Criteria variable	Learners' academic engagement							
	Adjusted R2	Result	F2	Result	Gof	Result	Stone & Geisser index Q2	Result
Social support Technology anxiety	0.607	Strong	0.143 0.211	Moderate Very strong	0.58	Very strong	0.315	Strong

Table 10 presents the adjusted R2 index values for the criterion or endogenous variable, with scores indicating weak (0.19), moderate (0.33), and strong (0.67) prediction quality. The combined effect of social support and technology anxiety strongly predicts the learner's academic engagement, accounting for 61% of the variance in the endogenous variable. The f2 index assesses the contribution of each predictor variable in R2, with values representing weak (0.02), moderate (0.15), and strong (0.35) prediction quality. From this index, it can be inferred that social support and technology anxiety have moderate and strong contributions, respectively, to the adjusted R2, with technology anxiety making a more significant impact. The Gof test, evaluating the goodness of fit index, yields a value of 0.58, surpassing the standard values of weak (0.01), moderate (0.26), and strong (0.36) quality measurement. This indicates a very strong fit of the model in testing the primary research question. Additionally, the Stone-Geisser index Q2 for the endogenous variable is 0.31, demonstrating a strong quality of the structural model concerning the first research question. As a result, the conceptual model of the research exhibits a favorable fit. The measurement model of the research, including coefficient estimation and significance, is provided in Figs. 1 and 2.

Q 2. To what degree is there a statistically significant relationship between the social support provided by teachers and the academic engagement levels exhibited by students?

To check the second question, Spearman's non-parametric correlation tests were used. Table 11 shows the correlation coefficient and significance level between the two variables of students' academic engagement and teachers' social support.

Table 11: Correlation coefficients between students' academic engagement and teachers' social support

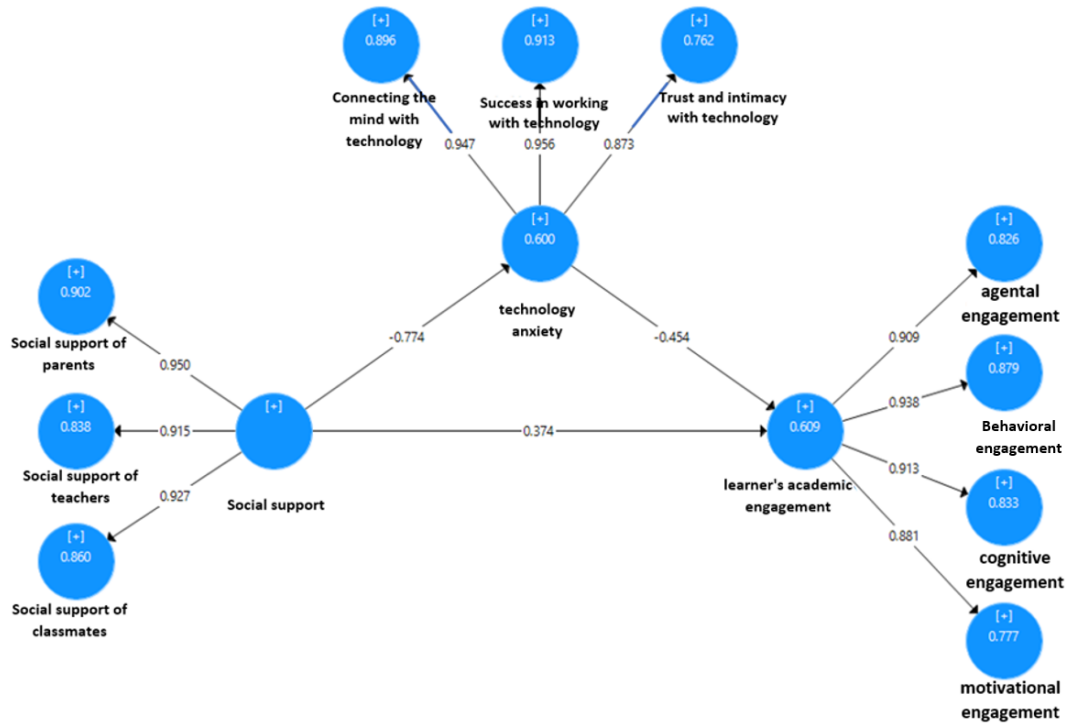| Predictor/Criteria variable	teachers' social support	
	Correlation coefficient	Sig
students' academic engagement	0.491**	0.001

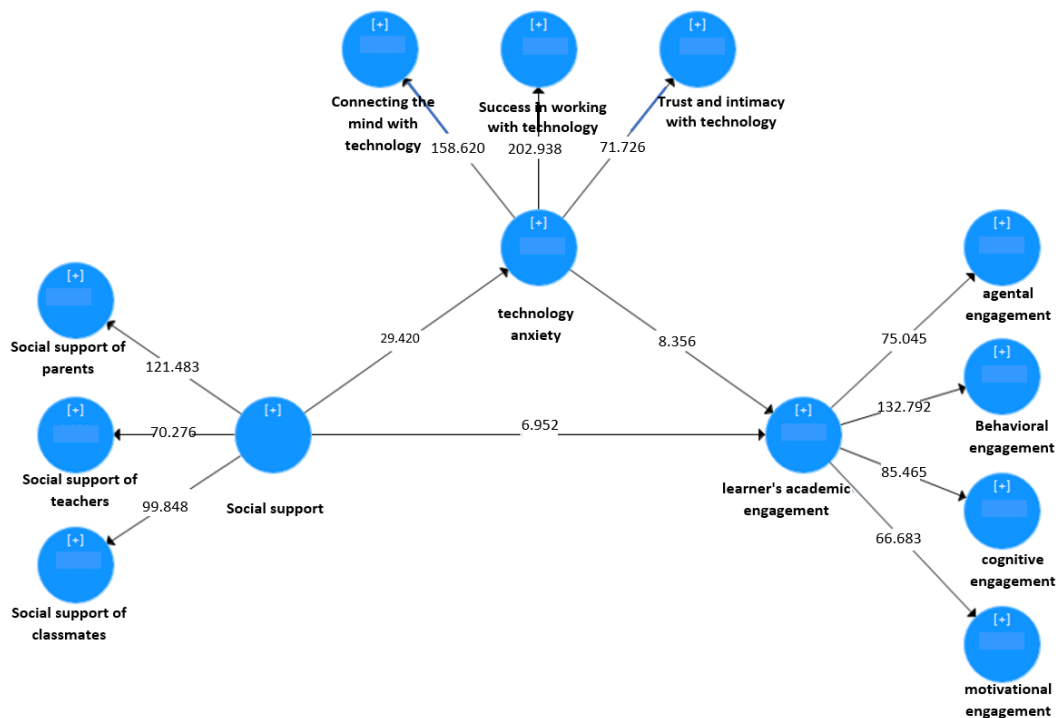**Fig. 1: Research measurement model in coefficient estimation mode**

Fig. 2: Research measurement model in the significance mode of coefficients

Based on the results presented in Table 11, a significant positive relationship is observed between students' academic engagement and teachers' social support, with a confidence level of 99%. The findings suggest that as students' academic engagement increases, there is a corresponding increase in the level of social support provided by teachers. The positive correlation coefficient further supports the direct relationship between these two

variables. Consequently, it can be concluded that students' academic engagement is indeed associated with the level of social support received from teachers.

Q 3. To what extent is a statistically significant relationship between parental social support and students' academic engagement levels?

Spearman's non-parametric correlation tests were employed to explore the third research question. The correlation coefficient and significance level between students' academic engagement and parents' social support are presented in Table 12. The analysis aims to determine the strength and direction of the relationship between these two variables within the context of educational technology.

Table 12: Correlation coefficients between students' academic engagement and parents' social support

Table		
Predictor/Criteria variable	Parents' social support	
	Correlation coefficient	Sig
Students' academic engagement	0.595**	0.001

According to the findings presented in Table 12, a significant relationship exists between students' academic engagement and the social support provided by parents, with a confidence level of 99%. It implies that as the student's academic engagement increases, parents' social support also increases. The positive correlation coefficient signifies a direct association between these variables, indicating that the academic engagement of the learner is positively linked to the level of social support offered by parents.

Q 4. To what degree is there a statistically significant relationship between the social support received from classmates and the

academic engagement levels demonstrated by students?

The fourth question was examined using Spearman's non-parametric correlation tests. Table 13 displays the correlation coefficient and significance level between the learner's academic engagement and the social support provided by classmates.

Table 13: Correlation coefficients between students' academic engagement and classmate's social support

Predictor/Criteria variable	The social support of classmate	
	Correlation coefficient	Sig
Students' academic engagement	0.533**	0.001

Based on the findings presented in Table 13, there is a significant relationship between the learner's academic engagement and the social support received from classmates, with a confidence level of 99%. It implies that as the student's academic engagement increases, so does the social support provided by classmates. The positive correlation coefficient indicates a direct association between these two variables, confirming that the learner's academic engagement is indeed connected to the social support received from classmates. The investigation of this question was conducted using Spearman's non-parametric correlation tests, and the results are illustrated in Table 13, where the correlation coefficient and significance level between the learner's academic engagement and the social support offered by classmates are presented.

Q 5. To what extent does technology anxiety act as a moderating factor in the relationship between social support and the academic engagement levels of learners?

Structural equation analysis using PLS software was employed to examine the fifth research question. The results of the significance test for the fifth research question are presented in Table 14.

Based on the findings presented in Table 14, the t-values associated with these relationships exceed the critical thresholds of 2.58 and -2.58. This outcome demonstrates that the relationships are statistically significant at a 99% confidence level. Furthermore, it was observed that technology anxiety plays a moderating role, accounting for a 9% variation in the relationship between social support and student academic engagement. This result supports the anticipation that the fifth research question will gain further validation with a larger sample drawn from the same population. Subsequently, Table 15 evaluates the predictive capacity of student academic engagement within the context of the fifth research question.

Table 15 provides insights into the predictive quality of the endogenous variable, as indicated by the adjusted R^2 index. This metric is measured on a scale with values of 0.19 (reflecting weak predictive quality), 0.33 (suggesting moderate predictive quality), and 0.67 (indicating strong predictive quality). In the case of the endogenous variable, which is the learner's academic engagement and the central focus of the research question, it was found to be strongly predicted with an explanatory power of 41%. Furthermore, the CV Red index assessed the structural model quality for the endogenous variable. The index also follows a scale featuring values of 0.02 (representing poor structural model quality), 0.15 (indicating moderate structural model quality), and 0.35 (reflecting strong structural model quality). In this instance, the learner's academic engagement variable achieved a CV Red value of 32%, signifying a robust structural model quality within the context of the fifth research question.

Table 14: The relationship between social support and the learner's academic engagement with the moderating role of technology anxiety

Relationship	Path coefficient (beta)	SD	t-value	Sig	Result
Social support on academic engagement	0.313	0.055	5.679	0.001	significant
Technology anxiety on academic engagement	-0.433	0.057	67.4	0.001	significant
Social support * technology anxiety on academic engagement	-0.094	0.028	3.419	0.001	significant

Table 15: Predictive power of the criterion variable in the fifth hypothesis of the research

Endogenous variable	Adjusted R^2	Result	CV Red	Result
Learner's academic engagement	0.317	Strong	0.613	Strong

Discussion

This research explored the relationship between social support and learners' academic engagement level, considering the mediating role of technology anxiety. The study hypothesized that social support would have a significant association with the level of academic engagement, with technology anxiety acting as a mediating factor. The analysis results indicated that the proposed model was acceptable, and all direct and indirect paths within the model were found to be significant. The findings pertaining to the research question are discussed and explained below.

The outcomes of the present study align with previous research by Weinert et al. [40], Lee et al. [42], and Salas et al. [41], which also emphasized the association between social support, academic engagement, and technology anxiety. This alignment can be attributed to the notion that reducing technology anxiety involves addressing behavioral, psychological, and physiological associated responses [49]. Social support plays a crucial role in influencing these responses, as users seek instrumental support to cope with stressful situations and emotional support to regulate negative emotions linked to technology-related stress [40]. Parents and teachers contribute to diminishing technology anxiety by providing tangible help, such as mobile phones, computers, and tablets, which enhances students' access to technology and alleviates anxiety. Additionally, educators and peers can impart essential knowledge and information to students, enabling them to use technology more proficiently. By fostering trust and reliance on teachers, parents, and classmates, students feel comfortable discussing their technological concerns and receive the emotional validation and assistance

they need. Offering feedback and guidance during technology use further reduces anxiety and enables deeper, more engaged learning experiences. Engaging in activities through educational technologies can heighten academic engagement, as various studies have demonstrated that technology can positively impact student engagement [e.g.,30-31].

The findings of this study also support the relationship between academic engagement and teachers' social support, aligning with prior research by Reeve et al. [50], Engels et al [2]., Wang and Eccles [4], Nouwen et al. [19], Azadi Dehbidi and Fouladchang [51], Hejazi et al. [52], Ramazani et al. [53], Hassannia and Sabzi [54], Rezaa'ee Varmazyaar et al. [55], and Moltafet et al. [56]. Because teachers, through their provision of social support, address the intrinsic psychological needs of students- such as competence, autonomy, and relatedness- facilitating and accelerating academic engagement in learning tasks. By meeting these fundamental needs, teachers enhance students' motivation and focus on classroom activities. Allowing students autonomy in their learning tasks and connecting school activities to their personal interests and goals fosters a sense of self-worth and a genuine interest in learning [57]. Establishing supportive and close relationships also leads students to internalize teachers' objectives, values, motivation, and learning strategies, consequently improving students' self-efficacy and increasing their engagement in the learning process [58].

The findings of the current study revealed a significant relationship between academic engagement and parental social support, corroborating the results of prior research by Wilcox et al. [59], Wang and Eccles [4], Nouwen et al. [19], Ursin et al. [19], Gutiérrez et al. [60], Pan et al. [58], Rezaa'ee Varmazyaar et al. [55], and Taghavi and Ekhtiari [61]. It can be noted

that a considerable portion of academic engagement is inherently social and emotional to explain this finding. Thus, a strong emphasis on fostering home-schools relationships and enhancing student-learning connections is vital for effective interventions [59]. Students who receive support from their parents' experience increased feelings of competence, control, and value toward education [19]. This parental assistance encompasses aiding in challenging assignments, providing guidance, encouragement, and rewards, and fostering a sense of student responsibility, ultimately leading to heightened engagement and academic progress.

Furthermore, the study's results demonstrated a positive correlation between academic engagement and peer/classmates' social support, aligning with previous studies by Wilcox et al. [59], Elsaesser et al. [62], Ansong et al. [63], Ursin et al. [18], Kiefer et al. [64], Pan et al. [58], Rabbani et al. [65], Azadi Dehbidi and Fouladchang [51], Hassannia and Sabzi [54], Rezaa'ee Varmazyaar et al. [55], and Taghavi and Akhtiari [61]. Peer and classmate support play a crucial role during adolescence, as it fulfills the teenagers' need for social connection and contributes to their satisfaction in the school environment [4]. The accessibility of supportive classmates who lend a listening ear and offer problem-solving assistance directly impacts academic engagement [63]. Moreover, implementing comprehensive and targeted support at the school and class levels can fortify positive academic attitudes and enhance engagement in the teaching and learning processes. Classmates who perceive the significance of education and support their peers' academic success act as important protective factors, influencing positive attitudes toward education and active participation in the learning process [19].

Conclusions

The primary aim of our study is to examine the intricate relationships among different aspects of social support, academic engagement, and the roles of technology anxiety, serving as both a mediator and a moderator. Specifically, our research is situated within the unique context of the COVID-19 pandemic, focusing on adolescents aged 13 and 14 in Famenin City, Hamadan province. Our investigation stems from the desire to gain insights into how these adolescents engaged with various technologies—from mobile phones and computers to laptops and tablets—to participate in virtual educational experiences during the challenging pandemic actively. Our compelling conclusion, drawn from a meticulous analysis of extensive descriptive data, underscores that a well-designed approach to instructional materials, with a notable emphasis on mobile phone compatibility, could offer substantial advantages. This assertion is firmly supported by the widespread prevalence of mobile phone access among our target demographic (89.3%), establishing them as a critical channel for delivering educational content in these exceptional circumstances. Consequently, recognizing adolescents' accessibility to technology for learning and aligning the virtual educational system accordingly is deemed indispensable.

The study's results exposed a nuanced relationship involving social support, technology anxiety, and the academic engagement of learners. Significantly, technology anxiety emerged as a key mediator in this intricate framework. It was observed that social support had a direct impact on technology anxiety, accounting for a substantial 77% of the variance. Simultaneously, technology anxiety played an indirect and

inhibiting role in diminishing learners' academic engagement. Consequently, a heightened level of access to diverse forms of social support was associated with reduced technology anxiety—a noteworthy observation in the context of virtual education. An intriguing aspect of the research involved the breakdown of social support based on its sources—teachers, parents, and classmates. The findings underscored the constructive contributions of all three sources of social support to the enhancement of academic engagement within the realm of virtual education. Furthermore, the study delved into another layer of relationship dynamics, revealing that technology anxiety moderates the interplay between social support and academic engagement. While the magnitude of this moderating effect may not have been as pronounced as the mediating role of technology anxiety, it retained both practical and statistical significance within the study's context. The direct influence of social support on technology anxiety, explaining a substantial 77% of the variance, is a noteworthy outcome. The study's findings highlight the significant impact of social support on technology anxiety within the realm of virtual education. So, adequate social support contributes to a reduction in technology anxiety, creating a more conducive environment for learning. The thorough analysis of inferential data substantiates this assertion, emphasizing the pivotal role of social support in alleviating technology-related anxieties.

In light of these insightful findings, it is imperative for policymakers, decision-makers, instructional designers, and educators engaged in the realm of virtual education to underscore the paramount importance of diverse forms of social support. Such emphasis holds the potential to substantially augment academic engagement and alleviate technology anxiety among adolescents aged 13 and 14. Through the judicious provision of adequate social support, learners may witness reduced technology-related anxieties, culminating in heightened participation in virtual education. It, in turn, promises to yield a more productive and gratifying learning experience, especially during difficult periods such as the COVID-19 pandemic. However, it is essential to acknowledge the inherent limitations of this study. The cross-section research accentuates the necessity for longitudinal investigations in this domain. Furthermore, the reliance on self-reported student data necessitates contemplating alternative data collection methods in subsequent studies.

Authors' Contribution

All authors have contributed equally to the execution and composition of this article.

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Conflicts of Interest

In this study, the authors declare no conflicts of interest.

Reference

[1] Schnitzler K, Holzberger D, & Seidel T. All better than being disengaged: Student engagement patterns and their relations to academic self-concept and achievement. *European Journal of Psychology of Education*. 2021; 36: 627-652. https://doi.org/10.1007/s10212-020-00500-6

[2] Engels M.C, Spilt J, Denies K & Verschueren K. The role of affective teacher-student relationships in adolescents' school engagement and achievement trajectories. *Learning and Instruction*. 2021; 75: 101485. https://doi.org/10.1016/j.learninstruc.2021.101485

[3] Haugan J. A, Frostad P & Mjaavatn P E. A longitudinal study of factors predicting students' intentions to leave upper

secondary school in Norway. *Social Psychology of Education*. 2019; 22: 1259-1279.
https://link.springer.com/article/10.1007/s11218-019-09527-0

[4] Wang MT, & Eccles JS. Adolescent behavioral, emotional, and cognitive engagement trajectories in school and their differential relations to educational success. *Journal of research on adolescence*. 2012; 22(1): 31-39.
 https://psycnet.apa.org/doi/10.1111/j.1532-7795.2011.00753.x

[5] Tabatabaee J, Sarfarazi E. Analysis of primary school students' academic failure with emphasis on the happy learning virtual program in the Corona pandemic. *Information and Communication Technology in Educational Sciences*, 2023; 13(3): 49-67.
https://dorl.net/dor/20.1001.1.22285318.1402.13.3.3.9

[6] Fredricks J A, Blumenfeld P C & Paris A H. School engagement: Potential of the concept, state of the evidence. *Review of educational research*. 2004; 74(1): 59-109.
https://psycnet.apa.org/doi/10.3102/00346543074001059

[7] Martínez I M, Youssef-Morgan C M, Chambel M J & Marques-Pinto A. Antecedents of academic performance of university students: Academic engagement and psychological capital resources. *Educational Psychology*. 2019; 39(8): 1047-1067.
http://dx.doi.org/10.1080/01443410.2019.1623382

[8] Fredricks J A. Academic engagement. *International Encyclopedia of the Social & Behavioral Sciences*. 2015; 2(1).31-36.

[9] Alrashidi O, Phan H P & Ngu B H. Academic engagement: an overview of its definitions, dimensions, and major conceptualizations. *International Education Studies*. 2016; 9(12): 41-52. http://dx.doi.org/10.5539/ies.v9n12p41

[10] Appleton J, Christenson S L, Kim D & Reschly A L. Measuring cognitive and psychological engagement: Validation of the Student Engagement Instrument. *Journal of school psychology*. 2006; 44(5), 427-445.
https://psycnet.apa.org/doi/10.1016/j.jsp.2006.04.002

[11] Reeve J & Tseng M. Agency as a fourth aspect of student engagement during learning activities. *Contemporary Educational Psychology*. 2011; 36, 257–267.
https://psycnet.apa.org/doi/10.1016/j.cedpsych.2011.05.002

[12] Reeve J. How students create motivationally supportive learning environments for themselves: The concept of agentic engagement. *Journal of educational psychology*. 2013; 105(3), 579. https://psycnet.apa.org/doi/10.1037/a0032690

[13] Bronfenbrenner U. Ecology of the family as a context for human development: Research perspectives. *Developmental Psychology*. 1986; 22(6), 723–742.
https://psycnet.apa.org/doi//10.1037/0012-1649.22.6.723

[14] Lam S F, Jimerson S, Kikas K, Cefai C H, Veiga F, Nelson B, Hatzichristou C, Polychroni F, Basnett J, Duck R, Farrell P, Liu Y, Negovan, V, Shin H, Stanculescu H, Wong B, Yang H, Zollneritsch J. Do girls and boys perceive themselves as equally engaged in

school? The results of an international study from 12 countries. *Journal of School Psychology*. 2012; 50, 77-94.
http://dx.doi.org/10.25115/ejrep.v19i53.3871

[15] Skinner E A & Pitzer J R. Developmental dynamics of student engagement, coping, and everyday resilience. In *Handbook of research on student engagement*. 2012; (pp. 21-44). Springer, Boston, MA.
http://dx.doi.org/10.1007/978-1-4614-2018-7_2

[16] Cohen S. Social relationships and health. *American psychologist*. 2004; 59(8), 676.
https://psycnet.apa.org/doi/10.1037/0003-066X.59.8.676

[17] Hsu J Y, Chen C C, Ting PF. Understanding MOOC continuance: An empirical Examination of social support theory. *Interactive Learning Environments*. 2018; 26(8), 1-19.
http://dx.doi.org/10.1080/10494820.2018.1446990

[18] Ursin P, Järvinen T & Pihlaja P. The Role of Academic Buoyancy and Social Support in Mediating Associations Between Academic Stress and School Engagement in Finnish Primary School Children. *Journal of Educational Research*. 2020; 65(4), 661-675.
http://dx.doi.org/10.1080/00313831.2020.1739135

[19] Nouwen W, Clycq N. The role of social support in fostering school engagement in urban schools characterised by high risk of early leaving from education and training. *Social Psychology of Education*. 2019; 22(5), 1215-1238.
https://link.springer.com/article/10.1007/s11218-019-09521-6

[20] Moreira P A & Lee V E. School social organization influences adolescents' cognitive engagement with school: The role of school support for learning and of autonomy support. *Learning and Individual Differences*. 2020; 80, 101885.
http://dx.doi.org/10.1016/j.lindif.2020.101885

[21] Chong W H, Liem D, Huan S, Kit P L & Ang R P. Student perceptions of self-efficacy and teacher support for learning in fostering youth competencies: Roles of affective and cognitive engagement. *Journal of Adolescence*. 2018; 68, 1-11.
http://dx.doi.org/10.1016/j.adolescence.2018.07.002

[22] Xerri M J, Radford K & Shacklock K. Student engagement in academic activities: a social support perspective. *Higher education*. 2018;75(4), 589-605.
https://link.springer.com/article/10.1007%2Fs10734-017-0162-9

[23] Rautanen P, Soini T, Pietarinen J & Pyhältö K. Primary school students perceived social support in relation to study engagement. *European Journal of Psychology of Education*. 2021; 36(3), 653-672.
https://psycnet.apa.org/doi/10.1007/s10212-020-00492-3

[24] Zhang H, Sun C, Liu X, Gong S, Yu Q & Zhou Z. Boys benefit more from teacher support: Effects of perceived teacher support on primary students' creative thinking. *Thinking skills and creativity*. 2020; 37, 100680.
http://dx.doi.org/10.1016/j.tsc.2020.100680

[25] Brunsting N C, Zachry C, Liu J, Bryant R, Fang X, Wu S & Luo Z. Sources of perceived social support, social-emotional experiences, and psychological well-being of international students. *The Journal of Experimental Education*. 2021; 89(1), 95-111.
https://psycnet.apa.org/doi/10.1080/00220973.2019.1639598

[26] Murray C, Kosty D & Hauser-McLean K. Social support and attachment to teachers: Relative importance and specificity among low-income children and youth of color. *Journal of Psychoeducational Assessment*, 2016; 34(2), 119–135.
https://psycnet.apa.org/doi/10.1177/0734282915592537

[27] Cohen S & Wills T. A. Stress, social support, and the buffering hypothesis. *Psychological Bulletin*. 1985; 98(2), 310–357. https://psycnet.apa.org/doi/10.1037/0033-2909.98.2.310

[28] Dobbins C & Denton P. My WallMate: An Investigation into the use of mobile technology in enhancing student engagement. *TechTrends*, 2017; 61(6), 541-549.
http://dx.doi.org/10.1007/s11528-017-0188-y

[29] Bray A & Tangney B. Enhancing student engagement through the affordances of mobile technology: a 21st century learning perspective on Realistic Mathematics Education. *Mathematics Education Research Journal*. 2016; 28(1), 173-197.
http://dx.doi.org/10.1007/s13394-015-0158-7

[30] Schindler L A, Burkholder G J, Morad A & Marsh C. (2017). Computer-based technology and student engagement: a critical review of the literature. *International journal of educational technology in higher education*, 14(1), 1-28.
http://dx.doi.org/10.1186/s41239-017-0063-0

[31] Bond M, Bedenlier S. Facilitating Student Engagement Through Educational Technology: Towards a Conceptual Framework. *Journal of Interactive Media in Education*. 2019; 11(1), 1-14. http://dx.doi.org/10.5334/jime.528

[32] Olalere Yusuf M. Information and communication technology and education: Analysing the Nigerian national policy for information technology. *International Education Journal*. 2005; 6(3), 316-321.

[33] Inan F A & Lowther D L. (2010). Factors affecting technology integration in K-12 classrooms: A path model. *Education Technology Research and Development*. 2021; 58, 137-154.
http://dx.doi.org/10.1007/s11423-009-9132-y

[34] Zheng J & Li S. What drives students' intention to use tablet computers: An extended technology acceptance model. *International Journal of Educational Research*. 2020; 102, 101612. https://doi.org/10.1016/j.ijer.2020.101612

[35] Celik V & Yesilyurt E. Attitudes to technology, perceived computer self-efficacy and computer anxiety as predictors of computer supported education. *Computers & Education*. 2013; 60(1), 148-158.
http://dx.doi.org/10.1016/j.compedu.2012.06.008

[36] Abdullah F & Ward R. Developing a General Extended Technology Acceptance Model for E-Learning (GETAMEL) by analysing commonly used external factors. *Computers in human behavior*. 2016; 56, 238-256.
http://dx.doi.org/10.1016/j.chb.2015.11.036

[37] Maricutoiu L P. A meta-analysis on the antecedents and consequences of computer anxiety. *Procedia-Social and Behavioral Sciences*. 2014; 127, 311-315.
http://dx.doi.org/10.1016/j.sbspro.2014.03.262

[38] Zhou J & Yu H. Contribution of social support to home-quarantined Chinese college students' well-being during the COVID-19 pandemic: The mediating role of online learning self-efficacy and moderating role of anxiety. *Social Psychology of Education*. 2021; 24(6), 1643-1662.
https://link.springer.com/article/10.1007%2Fs11218-021-09665-4

[40] Weinert C, Maier C, Laumer S & Weitzel T. Technostress mitigation: an experimental study of social support during a computer freeze. *Journal of Business Economics*. 2020; 90(8), 1199-1249.
https://link.springer.com/article/10.1007/s11573-020-00986-y

[41] Salas C, Parra V, Delgado F D, Olivares H. Influence of Teacher-Student Relationships and Special Educational Needs on Student Engagement and Disengagement: A Correlational study. *Frontiers in Psychology*. 2021; 12,1-12.
http://dx.doi.org/10.3389/fpsyg.2021.708157

[42] Lee J C & Xiong L N. Investigation of the relationships among educational application (APP) quality, computer anxiety and student engagement. *Online Information Review*. 2022; 46(1), 182-203. http://dx.doi.org/10.1108/OIR-08-2020-0348

[43] Zhou J & Yu H. Contribution of social support to home-quarantined Chinese college students' well-being during the COVID-19 pandemic: The mediating role of online learning self-efficacy and moderating role of anxiety. *Social Psychology of Education*. 2021; 24(6), 1643-1662.
https://link.springer.com/article/10.1007%2Fs11218-021-09665-4

[44] Ramazani M, Khamesan A. Psychometric characteristics of Reeve's academic engagement questionnaire 2013: with the introduction of the Agentic Engagement. *Quarterly of Educational Measurement*, 2017; 8(29): 185-204. [In Persian]
https://doi.org/10.22054/jem.2018.22660.1555

[45] Malecki C K & Demaray M K. Weapon carrying and perceptions of social support in an urban middle school. *Journal of Emotional and Behavioral Disorders*. 2003; 11, 169-178.
http://dx.doi.org/10.1177/10634266030110030401

[46] KHAMESAN AHMAD ABOUTALEBI FATEME. Validation of Child and Adolescent Social Support Scale (CASSS2000). 2010; Research project of Birjand University. [In Persian]

[47] Bandalos D & Benson J. Testing the factor structure invariance of a computer attitude scale over two grouping conditions. *Educational and Psychological Measurement*, 1990; 50(1), 49–60.
https://psycnet.apa.org/doi/10.1177/0013164490501005

[48] ZAKI M. Testing and validating of the computer anxiety scale (cas) among male and female trainees of computer institutes in esfahan. Information and Communication Technology in Educational Sciences [Internet]. 2012;2(4 (8)):5-28. [In Persian]

[49] Weinert, C., Laumer, S., Maier, C., & Weitzel, T. "The Effect of Coping Mechanisms on Technology Induced Stress: Towards a Conceptual Model." Americas Conference on Information Systems (2013).

[50] Reeve J, Jang H, Carrell D, Jeon S & Barch J. (2004). Enhancing Students' Engagement by Increasing Teachers' Autonomy Support. *Motivation and Emotion*, 28 (2), 147-169. https://psycnet.apa.org/doi/10.1023/B:MOEM.0000032312.95 499.6f

[51] Azadi Dehbidi F, Fooladchang M. Causal Model of Academic Engagement: The Role of Academic Support and Academic Self-Regulation. *Journal of Instruction and Evaluation*. 2019;12(47):159-183. [In Persian] https://doi.org/10.30495/jinev.2019.670901

[52] Hejazi E, Ghazi Tabatabaei M, Gholamali Lavasani M, Moradi A. The Teachers-Student Relationship and School Engagement: Mediating Role of Basic Psychological Needs*. Applied Psychological Research Quarterly*. 2014, 5(1), 19-40. [In Persian] https://doi.org/10.22059/japr.2014.52541

[53] Ramazani M, Khāmesan A, Rāstgoumoghadam M. The relationship between the perceived social support from teacher and academic engagement: The mediating role of academic self-regulation. *Educational Innovations*, 2019; 17(4): 107-124. [In Persian]

[54] Hassannia S, Sabzi N Causal Explanation of Academic Engagement Based on Academic Support and Students' Psychological Capital. *Studies in Learning & Instruction*. 2020; 12(1), 30-52. [In Persian] https://doi.org/10.22111/jeps.2022.6968

[55] Rezaaee Varmazyaar M A, Sadipoor E, Ebraahimi Ghavaam S, Delaavar A. The Effect of Perceived Social Support, Developmental and Psychological Capitals, and Psychological Well-Being on Academic Engagement: Testing a Conceptual Model. *QJOE*, 2021; 37 (2) :85-108. [In Persian]

[56] Moltafet G, Taghvainia A, Ayool A. The Investigation of Relationship between Perception from Classroom and Academic Engagement with Mediator Role of Academic Motivation. *Studies in Learning and Instruction*. 2020; 11(2):115-134. [In Persian] https://doi.org/10.22099/jsli.2020.5569

[57] Wang MT & Eccles JS. School context, achievement motivation, and academic engagement: A longitudinal study of school engagement using a multidimensional perspective. *Learning and Instruction*. 2013;28, 12-23. http://dx.doi.org/10.1016/j.learninstruc.2013.04.002

[58] Pan J, Zaff J, Donlan A. Social Support and Academic Engagement Among Reconnected Youth: Adverse Life Experiences as a Moderator. *Journal of Research on Adolescence*. 2017; 27 (4), 890-906. http://dx.doi.org/10.1111/jora.12322

[59] Wilcox G, McQuay J, Blackstaffe A, Perry R, Hawe P. Supporting Academic Engagement in Boys and Girls. Journal of School Psychology. 2017; 1-14. http://dx.doi.org/10.1177/0829573517703239

[60] Gutiérrez M, Tomás J, Romero I, Barrica J M. Perceived Social Support, School Engagement and Satisfaction with School. *Revista de Psicodidáctica*. 2017;22 (2), 111–117. https://doi.org/10.1016/j.psicoe.2017.05.001

[61] Taghavi H, Ekhtiary F. Social Support and Student' s Information Seeking Behavior: The Mediator Role of Academic Engagement. *Journal of Academic Librarianship and Information Research*. 2020;53(4):97-110. [In Persian] https://doi.org/10.22059/jlib.2020.299249.1473

[62] Elsaesser C, Heath RD, Kim JB & Bouris A. The long-term influence of social support on academic engagement among Latino adolescents: Analysis of between-person and within-person effects among Mexican and other Latino youth. *Youth & Society*. 2018; 50(8), 1123-1144. https://doi.org/10.1177/0044118X16656086

[63] Ansong D, Okumu M, Bowen GL, Walker AM, Eisensmith SR. The role of parent, classmate, and teacher support in student engagement: Evidence from Ghana. *International Journal of Educational Development*. 2017; 54, 51-58. https://doi.org/10.1016/j.ijedudev.2017.03.010

[64] Kiefer SM, Alley KM & Ellerbrock CR. Teacher and peer support for young adolescents' motivation, engagement, and school belonging. *RMIE Online*. 2015;38(8), 1-18. http://dx.doi.org/10.1080/19404476.2015.11641184

[65] Rabbani Z, Talepasand S, Rahimianboogar E, Mohammadifar M. Relationship Between Classroom Social Context and Academic Engagement: The Mediation Roles of Self-System Processes, Academic Motivation and Emotions. *Development Psychology*, 2017; 14(53): 37-51. [In Persian]

[66] Salimi A, Zangeneh H. [The effect of gamification on vocabulary learning (learning English as a second language) among the fifth-grade elementary school students]. *Tech. Edu. J. 2022; 16(4): 723-734*. http://dx.doi.org/10.22061/tej.2022.8550.2686

[67] Jafarei ShadPei M, Zangeneh H. [Designing and Developing a Multimedia to Instruct the Alphabet signs to First-grade Elementary Students (Turkish Language)]. Journal of Teaching Persian to Speakers of Other Languages. 2020; 9(19): 251-274. http://dx.doi.org/10.30479/jtpsol.2021.12872.1476

[68] Zangeneh H, Pourjamshidi M, Yenkimaleki M. [The Effectiveness of Digital Game-based Learning on Alphabet Signs and Word Learning in Persian to Non-Persian-Speaking Children. Computer-Assisted Language Learning Electronic Journal (CALL-EJ)]. 2023;24(3):212-231.

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