

**RESEARCH PAPER****Learning Style of Undergraduate University Students with Anxiety****Aiman Rahim**

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ABSTRACT

This study explores the relationship between anxiety and learning styles among undergraduate students, focusing on how anxiety influences their preferred learning modalities. Learning styles, including visual, auditory, and kinesthetic, are shaped by individual preferences and cognitive traits. Anxiety, which impacts cognitive functions, may also affect learning behaviors, but this intersection is underexplored, especially in the Pakistani academic context. A qualitative case study design was used, with purposive sampling to select ten undergraduate students diagnosed with anxiety using the GAD-7 scale. The VARK questionnaire assessed learning styles, and unstructured interviews provided insights into students' experiences. Most participants preferred kinesthetic learning, with common themes of avoidant behavior, difficulty focusing, and social interaction challenges due to anxiety. Instructors should adapt teaching strategies to accommodate anxiety-related learning preferences, such as providing flexible, interactive learning environments and personalized study approaches. Further research is needed on anxiety's long-term impact on learning.

Keywords: Anxiety, Educational Psychology, Learning Style, Qualitative Study, University Students

Introduction

The concept of learning styles is based around the premise that individuals can be classified or categorized according to their patterns of learning behavior. A number of theories exist in this regard. However, they differ in their approach of how these categories should be formed. The development of learning styles may be potentially influenced by a variety of factors (internal/external) and circumstances. Individuals prefer to learn in a particular style, that is, they may prefer information to be presented visually, or verbally etc. Individuals vary in the degree to which they can differentiate between various forms of information. While some people may be better at learning to distinguish between pieces of visual information, others may have an increased ability to discriminate between sounds. Certain evidence in support of this proposition exists; some researchers have theorized that this may be reflected in patterns of activity within the brain. In the academic field, it was proposed that teaching students in their preferred learning style resulted in improved learning (Bloomer & Hodkinson, 2000). Dixon and Mason (2023) found that learning styles have a significant impact on student performance, emphasizing the importance of individualized teaching methods.

Learning Modalities

Learning modalities represent a combination of perception and memory. It is difficult to determine the number of learners having a strong preference for just one modality (Cassidy, 2004). The issue of accuracy and reliability of measuring a learner's preferences remains. Coffield (2004) did not find any evidence to ascertain whether matching the mode of instruction to an individual's sensory/ perceptual strengths and weaknesses is more effective than designing content-appropriate forms of presentation and response. It is more achievable to align the method of instruction with the nature of the subject matter as opposed to individual preferences. Similarly, Marzano (1998) found that

graphic and tactile representations of information had marked effects on learning outcomes, regardless of any attempt to match them with individuals' modalities.

Cognitive Styles

Cognitive styles are biologically based and relatively stable. Many competing and overlapping theories exist in this area too. The verbal-imagery dimension and the holist analytic dimension (Riding & Read, 1996) are two of the more widely accepted types of cognitive style.

Imagers tend to think pictorially whereas Verbalizers represent information in the form of words. Therefore, imagers learn best from pictorial representations of information, while verbalisers learn best from words/text (Constantinidou & Baker, 2002).

Holists have a global, general to particular, view of information. On the other hand, Analytics break information into its constituent parts. The primary consideration for the holist-analytical dimension is the organization of information. Holists tend to prefer a 'breadth-first' structure giving themselves an overall view of a topic before going in to detail. On the other hand, analytics prefer an in depth and sequential approach, where each topic is explored fully before moving onto the next one (Jaspers, 1994).

There is some evidence (Ford & Chen, 2001; Riding & Watts, 1997) that matching learning materials to a student's cognitive style can potentially improve their performance and satisfaction. However, some authors argue that the mismatching of materials and learning styles may be favorable as it would help students to develop a more balanced approach. Constantinidou and Baker (2002) found pictorial presentation to be advantageous for all adults involved in an item-recall test, especially for those with a strong partiality for verbal processing.

Learning Styles and Learning Strategies

The argument that learning styles are not determined by inherited characteristics, and are instead developed through experience has been argued by a significant number of theorists and researchers (Kolb, Honey and Mumford, for instance). Therefore, it can be surmised that learning styles are not necessarily fixed, but can change or refine over time depending on the influence of the circumstances and the individual himself. Learning styles have been shown to have varying levels of effectiveness depending on the educational setting (Zhang & Liu, 2024).

Theorists such as Entwistle, (1998) have been more interested in how students undertake a specific learning task (learning strategy) as opposed to any habitual preference (learning style). The interaction between the learner, context and the nature of the task has been a common emphasis for these authors. According to Bloomer and Hodkinson (2000), learning styles are only a minor factor in shaping how learners react to learning opportunities: the affects of contextual, cultural and relational issues may be of increased importance.

Being aware of one's own thought and learning processes (meta cognition and critical thinking) is one of the most important advantage of applying the learning styles theory to learning and teaching. According to Sadler-Smith (2001), knowledge of learning styles may increase students' adaptability to different situations. Ramsden (1983) made a similar claim regarding learning strategies claiming that the awareness of a range of strategies is likely to bring about the correct selection of one for a particular task.

Anxiety

Anxiety is referred to as the constant excessive fear or worry concerning a particular event or several areas of life. The fear is disproportionate to the actual situation that an individual is facing. In an educational setting, anxiety has the potential to influence multiple areas including learning, attention, interpretation, social interaction, beliefs/ expectations, concentration, memory and even the overall health. The fear/worry often leads to significant distress and may cause significant interference (often avoidance) in daily activities.

Literature Review

Existing literature has the following views about the influence of anxiety on learning:

Anxiety and Interpretation

It is a scientific fact that attention is biased toward threat. Anxious students have a constant stream of negative automatic thoughts. Their mind is preoccupied with worrying over dangers and evaluating the risk or outcomes of an action/situation. They may even interpret neutral situations (such as class room discussion) as threatening or dangerous (Gamble, 2007).

Anxiety and Concentration

Worry takes up mental capacity needed for other tasks –As the severity of anxiety increases, students' ability of problem solving and concentrating on academic tasks decreases. Suppressing anxious thoughts is difficult because they are highly intrusive and appear to occur spontaneously (Gamble, 2007).

Anxiety and Memory

Anxiety is associated with poor recall of previously mastered materials, general memory deficits and decreased short term memory capacity. According to research, the reasons behind it may be that the same area of the brain (medial temporal lobe) plays a role in both memory and anxiety. This is possibly indicative of a dysfunction in these brain structures/processes. Also, the initial encoding is undermined by poor attention of anxiety prone individuals (Moreno & Myer, 1994).

Anxiety and Social Interaction

The cognitive biases of focusing on potential threats (at the expense of social cues) lead to the same reaction to neutral cues as if threatened. As a result, anxious students show decreased social competency and avoid peer interactions that involve potential threat to reduce anxiety (Gamble, 2007).

Anxiety and Beliefs/Expectations

Unrealistic expectations of performance are brought about by high standards and perfectionist beliefs. Self comparisons are relative to peer group are rampant and the inability to live up to expectations creates distress. Gifted students in gifted student classes have reported increased anxiety levels and decreased academic self concept (Gamble, 2007).

Anxiety and Health

Various physical complaints (such as sleep disturbance, headaches, fatigue, nausea, unexplained illness) are included in anxiety symptoms. Research indicate that anxious students have a higher resting heart rate, blood pressure, skin conductance (tension) and

cortisol level(stress hormone). Since the symptoms are real, there is an increased probability of missing out school days and learning opportunities (Gamble, 2007).

Previous researches have linked high levels of anxiety with a decreased ability to learn and a reduced academic performance. However, they have not addressed whether certain learning styles are specifically adapted by students who have anxiety. Moreover, the possible impact and influence of these learning styles has not been evaluated. Furthermore, such a research has not been conducted before within the context of the Pakistani academic environment of undergraduate university students. The beneficiaries of this research range from academic planners, course organizers and teaching instructors to the students themselves. An understanding and realization of the types of learning styles that are likely to be incorporated during anxiety will help the instructors to cater to the specific individual needs of students. The teaching style can be altered in accordance with anxiety provoking situations. Thus, the significance of this research is paramount. There is a vast scope for further research as well in which the efficacy and desirability of the preferred learning styles can be examined.

Material and Methods

The study has opted for a qualitative research design because the aim is to obtain in-depth data pertinent to the subject matter, rather than broad surface-level data. The qualitative method, with its interpretive approach, is well-suited to addressing the research question. It features a flexible, emergent design conducted in a naturalistic setting. A case study has been selected as the most desirable and appropriate method of data collection. This choice is based on the intention to thoroughly examine the lived realities, complex interrelationships, and idiosyncratic qualities of the phenomenon under investigation. Furthermore, case studies facilitate rich conceptual development.

Sampling

Purposive sampling was used as the participants were selected on the basis of whether or not they were experiencing anxiety. Ten students from the BS (Honors) program in universities made up the 'cases' of this multiple case study design. The popular GAD-7 scale was used to determine the presence and severity of anxiety in them. Research based evidence has validated the use of this scale for the measurement of generalized anxiety disorder. This renders it suitable for the purpose of this study. Data was collected from multiple sources as detailed below:

Questionnaire

To determine the type of learning style preference prevalent in the anxious students, the VARK questionnaire (version 7.1 released in 2011) was used. It is one of the most popular and widely used tools for the measurement of learning styles. The VARK questionnaire is based upon Neil Fleming's VARK model which proposes that all learning styles can be categorized under the four labels of Visual, Aural, Read/Write or Kinesthetic. There is sufficient evidence for the reliability and validity of this tool as it has already been used in a number of researches on learning styles.

Interview

Participants were interviewed using an unstructured approach. Four open ended questions were asked as prompts to probe in to their learning styles. The participants were inquired about their views of how their learning styles have influenced their studies, lectures/ note taking, interactions with others and their own selves personally. The responses of interviewees were recorded and transcribed for thematic analysis.

Confidentiality

Participants of this research study were assured of that their privacy will be maintained by protecting their identity and not using it for any ulterior purpose beyond the boundaries of research. Informed consent was obtained from them and they were debriefed of the study's purpose after conduction of the questionnaire and interview.

Thematic Analysis

Thematic Analysis and coding will be used to examine and interpret the qualitative data obtained from the interviews. First of all, the interviewees were questioned about the possible personal advantages of getting to know their learning styles. They related that this would enable them to become more self-aware and they will be motivated in to understanding the reasons behind their learning preference. Moreover, they will realize which learning techniques are more beneficial for them and develop a suitable study routine accordingly.

Next, the interviewees were questioned about their perspective of how their learning style has influenced their interactions with others. One student answered that learning styles determine the mode of interaction (whether participative/ non participative) inside the class room. Another student was of the view that learning styles differentiate between academic and personal relationships implying that students' behavior towards each other differs and becomes more open when outside the pressures of an academic/ learning environment. Other participants related that their learning styles were Independent and avoidant (of group work/ collaborations with other students) and due to their introvert, shy, socially anxious/ withdrawn nature. They had a non-participative attitude in class due to hesitation, over thinking and the fear negative evaluation. An interviewee even narrated a story of being bullied as a child in school. This incident had made her socially anxious and afraid to speak up or express her thoughts. A constant stream of negative automatic thoughts and future predictions serves as a Self-fulfilling prophecy.

The lack of confidence and initiative in participants has restricted their interaction to only a few familiar class fellows. The constant worrying drains them of energy and they find social situations to be demanding and embarrassing (if they fail to live up to others' expectations). The fear of other people's judgments leads them to adopt safety behaviors such as staying alone/ solitary work.

The participants were further questioned about the influence of their learning styles in studies. An interviewee suggested that learning styles can be directly correlated with academic performance. Whether a learning style works varies from one individual to another. Being aware of one's learning style can enable one to make a critical self-evaluation about its advantages and disadvantages. One student who reported being a visual learner stated that it was difficult for her to sustain attention during lengthy oral discussions without the use of visual stimuli and that she preferred watching videos to reinforce her learning. She has a very careful learning approach and adopts a holistic perspective (preferring to look at the larger picture first). Other interviewees stated that movement gave them a mental boost for learning as they felt less distracted, restless and more motivated to focus. They stated that preparing for assessments proved to be a stressful experience for them so they tended to procrastinate. Even while learning they practiced constant repetition and reported a self-doubt/ fear of forgetting or missing out something. Read/Write learners said that due to rumination their mind was often flooded with thoughts and they found it difficult to remain in the present moment. Hand written notes increase the frequency of their exposure to the targeted material enabling them to absorb it as a slower and more manageable pace.

When inquired about the influence of their learning styles on lectures/ note taking, the interviewees replied that their note taking style corresponded with their learning styles. Read/ write learners stated that they engage in constant note writing because they do not trust their memory. The Kinesthetic learners preferred dynamic lectures which engage all

of their senses. Their attention is directed more towards the movements and body language of the teacher and their class fellows. They aspire for a liberated and flexible learning environment such as where they can move freely without restriction. They find their learning style to be a hindrance rather than a help during lectures because their constant fidgeting and foot tapping is a source of annoyance for those sitting next to them. The interviewee with a visual style contributed that she prefers taking pictures of others' notes and the points written by the teacher on the white board.

Emerging themes

Self-awareness

The conscious realization of their learning preference enabled participants to embrace their personality. They explored their individuality and the unique underlying reasons behind it. Moreover, they were encouraged to observe the implications of their personal learning style.

Avoidant behavior

All participants reported non-participative behavior in the classroom discussions. All of them shared the same Cognitive component of learning styles; that is, being Independent and Avoidant. Furthermore, they shared the same personality traits: introversion, shyness, socially withdrawn nature. Over thinking, hesitation and fear of judgment/negative evaluation were also some of their shared traits. All these are characteristics of anxiety and show how anxiety can influence learning styles.

Difficulty in sustaining attention

Each learning style has its own strengths and limitations. However, the influence of anxiety becomes evident here; all the participants reported that it was difficult for them to focus as they got easily distracted.

Note taking style corresponds with learning style

Each interviewee reported giving selectively more attention to kinesthetic, read/write or visual stimuli (in accordance with their individual learning preference) during lectures and note taking.

Final inference

All participants experience difficulty in sustaining attention and display Avoidant/non-participative behavior due to Anxiety (the central core category).

Results and Discussion

The scoring of the VARK questionnaire (Version 7.1) from the ten participants indicated the following results:

Table 1
Scoring of the VARK questionnaire

Learning style	Visual	Aural	Read/Write	Kinesthetic
Number of participants	1	-	3	6

Out of the ten participants, six were identified with a kinesthetic writing style. Three of the ten participants had Read/ Write style, one had a Visual style while none of the participants were identified with an Aural style.

Validity

The authors (Leite and Svinicki, 2010) have examined the dimensionality of the VARK learning styles inventory. Four perceptual preferences are measured by VARK: visual (V), aural (A), read/write (R), and kinesthetic (K). VARK questions may be considered as testlets because respondents can choose multiple items within a question. The correlations between items within testlets can be called a type of method effect. To evaluate the dimensionality of the VARK, four multitrait-multimethod confirmatory factor analysis models were compared. The best fit to the VARK scores was provided by the trait-correlated method model. The research paper (Leite and Svinicki, 2010) provides evidence of the validity of VARK for the measurement of learning preferences. The study found preliminary support for the validity of the VARK scores. However, possible problems associated to item wording and the scale's scoring algorithm were acknowledged (these were later rectified in revised versions). In addition, the cautions with regard to using VARK in research were addressed.

Reliability

Given that VARK has not been used for high-stakes decisions, the reliability estimates for the scores of the VARK subscales (based on confirmatory factor analysis) were .85, .82, .84, and .77 for the visual, aural, read/write, and kinesthetic subscales, respectively, which are considered adequate (Leite & Svinicki, 2010).

Conclusion

This Qualitative research paper has attempted to explore the types of learning styles that are adopted by students. Results of the VARK questionnaire indicate that an overwhelming majority of the participants have a Kinesthetic learning style. This finding highlights the influence of anxiety in shaping up an individual's learning preference. It can be concluded that students suffering from anxiety are most likely to have a preference for the Kinesthetic learning style due to their restlessness and difficulty in relaxing which is the key feature of anxiety (as proposed by the GAD).

All the participants of the study were first identified with anxiety using the GAD-7 scale. They were further interviewed about their views of how their learning has influenced them personally, and how it has influenced their studies, lectures/ note taking and interaction with others. Thematic analysis of the interview transcripts has highlighted several common characteristics in relation to learning behavior- primarily, the preference for Independent and Non-participative learning. The participants showed an Avoidant attitude towards collaborative group learning. All of them reported experiencing difficulty in sustaining their attention and staying in the present moment. In addition, the common personality traits or attitudes observed in all the participants were introversion, social anxiety and withdrawn nature. Finally, the characteristic thought patterns of anxiety: over thinking, rumination and fear of judgment/ negative evaluation were reported by the participants.

Recommendations

In this research, the problem of understanding the relationship between anxiety and learning styles was addressed by employing a comprehensive qualitative approach that combined both self-report questionnaires and in-depth interviews. The use of the VARK questionnaire enabled the identification of students' preferred learning styles, while the GAD-7 scale allowed for the assessment of anxiety levels. By examining students' experiences through unstructured interviews, the research revealed common patterns in learning behavior, such as a preference for kinesthetic learning and avoidant behaviors stemming from anxiety. The findings suggest that instructors can address this issue by tailoring their teaching methods to accommodate anxiety-related learning preferences. For

instance, providing more interactive and flexible learning environments for kinesthetic learners, offering opportunities for individualized study routines, and fostering a supportive classroom atmosphere can mitigate the negative effects of anxiety. This research emphasizes the importance of recognizing anxiety as a significant factor influencing learning styles and adapting teaching strategies accordingly.

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