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The Impact of Artificial Intelligence on Human Creativity and Cognitive Dependency Among Young Adults Aged 20–35

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Abstract

The rapid integration of generative Artificial Intelligence (AI) technologies into academic and professional contexts has significantly transformed how individuals generate ideas, access information, and perform cognitively demanding tasks. Tools such as large language models, AI-assisted writing systems, and generative design platforms are increasingly embedded in everyday workflows, particularly among digitally active young adults. While these systems are widely framed for creativity and productivity, growing theoretical and empirical debates question their potential impact on independent thinking, cognitive engagement, and creative autonomy. Despite the intensity of this discussion, quantitative evidence examining whether habitual AI use is associated with perceived changes in creativity and psychological reliance remains limited.

The present study investigates the relationship between AI usage frequency and perceived creativity reduction, cognitive dependency, and creative self-confidence among young adults aged 20-35. This age represents a highly relevant population due to its high level of digital engagement, academic involvement, and formative professional development. The research is theoretically grounded in Self-Determination Theory, Cognitive Load Theory, and Cognitive Offloading Theory. Together, these frameworks provide a conceptual basis for understanding how external cognitive systems may influence autonomy, competence, and mental effort allocation. By integrating these perspectives, the study examines whether AI functions primarily as a cognitive amplifier that enhances creative exploration or as a cognitive shortcut that potentially reshapes internal engagement processes.

A quantitative cross-sectional correlational design was employed. Data were collected through an online survey administered to 39 participants in Neu-ulm/Ulm, Germany. The sample consisted primarily of university students and working students within the specified age range. The questionnaire measured AI usage frequency, perceived creativity reduction, cognitive dependency, creative self-confidence, and attitudes toward AI using multi-item Likert-scale instruments. Internal consistency reliability ranged from acceptable to strong across scales, indicating coherent measurement of the constructs. Pearson product–moment correlation analyses were conducted to examine associations between AI usage frequency and the primary psychological variables.

The results revealed no statistically significant relationships between AI usage frequency and perceived creativity reduction, cognitive dependency, or creative self-confidence. However,

significant associations were observed among the psychological constructs themselves. Perceived creativity reduction was strongly correlated with cognitive dependency and moderately associated with lower creative confidence. These findings suggest that the frequency of AI use alone may not predict negative psychological outcomes. Instead, subjective perceptions of reduced independent thinking appear more closely linked to feelings of reliance and diminished self-confidence.

The findings indicate that concerns surrounding AI may not be rooted solely in how often individuals use these tools, but in how they interpret their role within the creative process. Although limited by its modest sample size and cross-sectional design, the study provides an initial foundation for understanding AI-related psychological dynamics among young adults. It highlights the importance of fostering reflective AI literacy and metacognitive awareness to support autonomy and sustained creative development in increasingly AI-mediated environments.

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List of Abbreviations

AI – Artificial Intelligence

GenAI – Generative Artificial Intelligence

LLM – Large Language Model

SDT – Self-Determination Theory

CLT – Cognitive Load Theory

I-PACE – Interaction of Person–Affect–Cognition–Execution Model

EEG – Electroencephalography

fNIRS – Functional Near-Infrared Spectroscopy

SAP – Standard Assessment Paradigm

AICICA – AI-Chatbot-Induced Cognitive Atrophy

HNU – Hochschule Neu-Ulm

β – Standardized Regression Coefficient

r – Pearson Correlation Coefficient

α – Cronbach's Alpha

N – Sample Size

1. Introduction

1.1 Background and Context

Artificial Intelligence (AI) has moved from a specialized technological innovation to a common cognitive infrastructure embedded within everyday life. In particular, the emergence of generative AI systems has transformed how individuals access information, generate ideas, solve problems, and produce creative outputs. Tools such as ChatGPT, AI-powered writing assistants, image generators, automated coding systems, and algorithmic recommendation engines are no longer confined to research laboratories or highly technical industries. Instead, they are widely available to the general public and increasingly integrated into academic, professional, and creative workflows.

The diffusion of generative AI marks a qualitative shift in human–technology interaction. Earlier digital tools primarily supported information storage and retrieval. In contrast, generative AI systems actively produce structured outputs, simulate dialogue, synthesize large volumes of information, and generate novel combinations of ideas within seconds.

As a result, these systems function not solely as passive tools, but as interactive cognitive collaborators capable of participating in tasks traditionally associated with human reasoning and creativity.

For young adults in particular, AI tools have become embedded in daily routines. University students use AI systems to summarize academic texts, generate outlines, clarify complex theories, translate material, and draft written assignments. Professionals rely on AI for brainstorming, drafting emails, writing reports, coding support, data analysis, and content creation. Creative individuals experiment with AI-generated scripts, music, visual art, and conceptual prototypes. In many cases, AI is used not occasionally but habitually, shaping how tasks are initiated, structured, and completed.

The normalization of AI-assisted cognition raises fundamental questions about the evolving nature of human intellectual activity. If idea generation, memory retrieval, and structured reasoning can be partially delegated to algorithmic systems, how does this redistribution of

cognitive labor affect internal cognitive engagement? Does AI function primarily as a cognitive amplifier that expands human creative capacity, or does it gradually reduce the necessity for sustained mental effort and independent ideation?

Generative AI systems can extend working memory, accelerate access to knowledge, and reduce the time required for complex tasks. This efficiency introduces a paradox. On the one hand, AI may enhance productivity, support divergent idea exploration, and lower psychological barriers such as creative anxiety. On the other hand, by minimizing cognitive strain and offering immediate solutions, AI may reduce opportunities for productive struggle, deep processing, and autonomous problem-solving.

The rapid integration of AI into cognitive workflows makes it insufficient to focus solely on technological advancement or performance efficiency. It becomes essential to examine the psychological and cognitive implications of habitual AI use. Understanding how frequent interaction with generative systems shapes perceptions of creativity, autonomy, and cognitive reliance is particularly important in a generation that is digitally native and highly engaged with such tools.

Thus, the current technological landscape necessitates systematic investigation into whether AI serves as a catalyst for cognitive development or whether it subtly reshapes mental habits in ways that influence independent thinking and creative confidence.

1.2 Problem Statement

Public and academic discourse surrounding generative AI reflects a pronounced dual narrative. On one side, AI is framed as a transformative tool for creativity and innovation. Proponents argue that AI systems expand ideational capacity, facilitate brainstorming, accelerate iteration cycles, and enable users to explore a wider range of possibilities than would be feasible independently. From this perspective, AI functions as a collaborative partner that enhances human cognition rather than replacing it. Creative production becomes a process of interaction between human judgment and machine-generated suggestions.

On the other side, critics raise concerns regarding cognitive dependency and diminished mental engagement. If individuals repeatedly outsource idea generation, memory retrieval, structuring, and evaluative reasoning to AI systems, they may gradually reduce their involvement in effortful cognitive processing. The concept of cognitive offloading suggests that reliance on external tools can alter how individuals allocate mental effort and internalize knowledge. When tasks that once required sustained concentration are delegated to algorithmic systems, opportunities for schema construction, deep learning, and skill consolidation may decrease.

Beyond cognitive effort, repeated AI reliance may influence psychological constructs such as autonomy, perceived competence, and creative self-confidence. If individuals attribute successful outputs primarily to AI assistance rather than internal mastery, their sense of authorship and independent capability may shift. Over time, such shifts may contribute to cognitive dependency, defined not merely as frequent use but as perceived necessity and reduced confidence in performing tasks without AI support.

Despite the intensity of this debate, actual evidence remains fragmented. Much of the current discussion is theoretical, philosophical, or ethical in nature. Existing empirical studies often focus on short-term experimental tasks, specific professional groups, or heavy AI users. Few studies examine moderate, everyday AI use within naturalistic academic settings. Even fewer directly test whether simple frequency of AI use is statistically associated with perceived reductions in independent thinking, increased cognitive dependency, or diminished creative confidence.

This lack of integrated quantitative investigation represents a significant research gap. Without systematic real analysis, concerns about AI-induced cognitive dependency remain speculative, while claims of creative augmentation may overemphasize short-term performance gains without assessing broader psychological implications.

Accordingly, the core problem addressed in this study is the absence of verifiable clarity regarding the relationship between AI usage frequency and perceived cognitive and creative outcomes among young adults. Determining whether measurable associations exist is a necessary step toward moving the debate from conceptual speculation to data-driven understanding.

1.3 Research Aim

The primary aim of this study is to examine the relationship between AI usage frequency and psychological perceptions of creativity, cognitive dependency, and creative confidence among young adults aged 20–35.

Specifically, this research seeks to investigate whether higher levels of self-reported AI usage frequency are statistically associated with:

- Perceived reduction in independent thinking and creativity
- Increased cognitive dependency on AI tools
- Lower creative self-confidence

Using quantitative survey methodology and Pearson correlation analysis, this study does not attempt to establish causal relationships. Instead, it aims to identify whether significant associations exist within a naturalistic sample of digitally active young adults.

The selected age group is particularly relevant for several reasons. Individuals between 20 and 35 years of age are among the most intensive adopters of generative AI technologies. They frequently integrate AI systems into academic study, early career development, and creative production. This cohort is actively forming professional identities, consolidating cognitive skills, and developing long-term work habits. If AI usage influences perceptions of competence, autonomy, or creativity, such effects may be especially important during this developmental stage.

Furthermore, this generation will likely shape future workplace norms, creative industries, and educational practices. Understanding how AI interacts with cognitive self-perception in this group provides insight into potential long-term implications for workforce development and intellectual autonomy.

By examining the relationships between AI usage frequency and perceived cognitive and creative outcomes, this study contributes to a more precise understanding of AI's psychological impact. Rather than assuming AI is inherently empowering or inherently harmful, the research

aims to clarify how patterns of usage relate to subjective experiences of creativity and dependency within a digitally integrated generation.

1.4 Research Questions

Main Research Question:

How does frequent use of Artificial Intelligence affect creativity and independent thinking among young adults aged 20–35?

Sub-Questions:

- Do users perceive AI as improving or limiting their creativity?
- Is AI usage frequency associated with increased cognitive dependency?
- Is AI usage frequency associated with lower creative self-confidence?
- How do users balance AI assistance with personal cognitive effort?

1.5 Hypotheses

Based on theoretical considerations including Self-Determination Theory, cognitive dependency frameworks, and the concept of productive struggle, the following hypotheses were formulated:

H1: Higher AI usage frequency is associated with reduced independent thinking and creativity.

H2: Higher AI usage frequency is associated with increased cognitive dependency.

H3: Higher AI usage frequency is associated with lower creative self-confidence.

1.6 Structure of the Thesis

This thesis is structured into six main chapters.

Chapter 1 introduces the research topic and establishes the foundation of the study. It presents the background and context of generative artificial intelligence in academic and professional environments, outlines the problem statement, defines the research aim, introduces the research questions and hypotheses, and explains the overall organization of the thesis.

Chapter 2 presents the theoretical framework. It synthesizes core conceptual foundations including creativity theory, Cognitive Load Theory, cognitive offloading, Self-Determination Theory, and the I-PACE model. Key constructs such as generative AI, creativity, cognitive dependency, creative self-confidence, and AI usage frequency are conceptually defined. This chapter establishes the theoretical basis for understanding the psychological mechanisms underlying AI-related cognitive and creative processes.

Chapter 3 provides a comprehensive literature review. It examines empirical findings on AI-enhanced creativity, cognitive engagement, neural evidence, automation bias, psychological dependency, and moderating variables such as AI literacy and self-efficacy. Methodological tensions in existing research are identified, and the chapter concludes by outlining the research gap addressed by the present study.

Chapter 4 describes the methodology of the study. It outlines the quantitative cross-sectional research design, sampling procedure, participant characteristics, survey instrument, operationalization of variables, data analysis strategy using SPSS, and ethical considerations.

Chapter 5 presents the empirical results. It reports descriptive statistics, reliability analyses, Pearson correlation findings, and hypothesis testing outcomes. The relationships between AI usage frequency, creativity reduction, cognitive dependency, and creative self-confidence are examined and interpreted.

Chapter 6 discusses the findings in relation to the theoretical framework and prior research. The implications for creativity theory, cognitive offloading, and psychological autonomy are considered. Practical implications for educational and professional contexts are outlined, followed by a discussion of study limitations and recommendations for future research.

2.Theoretical Framework

2.1 Conceptual Synthesis and Definition of Core terms

The preceding theoretical and empirical discussion demonstrates that the relationship between generative AI, creativity, and cognitive functioning is multidimensional and conceptually complex. To ensure analytical clarity, this section synthesizes the reviewed frameworks and provides precise definitions of the central terms examined in the present study. These definitions integrate theoretical perspectives with empirical findings and establish the conceptual boundaries of the variables tested in the quantitative analysis.

Generative Artificial Intelligence (GenAI)

Generative Artificial Intelligence refers to computational systems capable of producing novel outputs—such as text, images, or structured ideas—through probabilistic pattern generation based on large-scale training data. Unlike traditional automation systems that execute predefined rules, generative AI systems simulate ideation processes and increasingly function as collaborative cognitive agents (Holzner et al., 2025). Their integration into academic and professional tasks shifts AI from a retrieval tool to a co-creative mechanism, thereby raising questions about authorship, autonomy, and cognitive delegation.

In the present study, AI engagement refers specifically to the use of generative AI tools for academic, professional, or creative task completion.

AI Usage Frequency

AI usage frequency is conceptualized as the self-reported regularity with which individuals interact with generative AI systems. It represents behavioral exposure rather than qualitative depth of reliance. Importantly, empirical research suggests that frequency alone does not necessarily predict reduced critical thinking or dependency (Lee et al., 2025). Consequently, this study treats usage frequency as a quantitative exposure variable rather than as a direct indicator of cognitive substitution.

Creativity

Creativity is commonly defined as the capacity to generate ideas that are both novel and contextually appropriate (Boden, 1998). Boden distinguishes three forms of creativity:

1. **Combinational creativity**, involving novel recombination of familiar elements;
2. **Exploratory creativity**, involving systematic exploration within an existing conceptual space;
3. **Transformational creativity**, involving modification of the structural dimensions of that conceptual space.

Transformational creativity is considered the most cognitively demanding, as it requires restructuring constraints rather than merely navigating within them.

In the context of generative AI, concerns arise particularly regarding exploratory and transformational creativity, as AI systems may efficiently generate combinational outputs while potentially reducing opportunities for deep conceptual restructuring (Holzner et al., 2025). The present study focuses on perceived exploratory creativity within everyday academic and professional contexts.

Perceived Creativity Reduction

Perceived creativity reduction refers to the subjective experience that independent idea generation or creative engagement has diminished as a consequence of AI use. This construct does not imply objective decline in creative ability; rather, it reflects shifts in perceived creative agency and authorship.

Neurocognitive research suggests that AI-assisted writing is associated with altered neural engagement patterns and reduced perceived ownership of output (Kosmyna et al., 2025). Such findings support the relevance of subjective perception when evaluating changes in creative autonomy.

Cognitive Offloading

Cognitive offloading describes the delegation of mental processes to external tools in order to reduce cognitive effort. While cognitive offloading can increase efficiency and lower perceived cognitive load (Ejaz et al., 2025), repeated delegation of ideation and evaluative reasoning may reduce engagement in deep cognitive processing.

Within the AI context, cognitive offloading extends beyond memory support to include creative and analytical substitution. This raises concerns regarding the long-term implications of outsourcing generative thinking processes.

Cognitive Dependency

Cognitive dependency refers to perceived psychological reliance on AI systems for initiating, structuring, or completing cognitively demanding tasks. Unlike simple convenience, dependency implies diminished confidence in independent analytical capacity.

Empirical evidence suggests that higher AI trust and integration may predict increased reliance and reduced independent reasoning (Zhang et al., 2025). Additionally, findings indicate that sustained AI interaction may influence emotional and cognitive attachment patterns (Fang et al., 2025).

In the present study, cognitive dependency is conceptualized as perceived reliance rather than demonstrated incapacity.

Creative Self-Confidence

Creative self-confidence refers to individuals' perceived competence in generating original ideas independently. Within Self-Determination Theory, competence represents a fundamental psychological need essential for intrinsic motivation (Deci & Ryan, 2000).

When AI-generated outputs are perceived as superior, individuals may recalibrate their internal competence evaluations, potentially affecting motivation and autonomy. Research suggests that AI assistance may simultaneously enhance performance outcomes while reducing perceived authorship (Kosmyna et al., 2025), thereby creating tension between output quality and internal confidence.

Positive Attitude Toward AI

Positive attitude toward AI refers to the belief that AI tools can enhance creativity and coexist with independent thinking. Augmentation research demonstrates that AI collaboration can improve output quality and ideational fluency (Holzner et al., 2025). However, positive evaluations do not necessarily eliminate the potential emergence of dependency dynamics.

In this study, positive attitude is treated as an evaluative belief system distinct from behavioral frequency or psychological reliance.

2.2 Creativity as a Cognitive Process in the Age of Artificial Intelligence

Creativity is most commonly defined as the capacity to generate ideas, solutions, or products that are both novel and appropriate within a given context (Boden, 1998; Runco & Jaeger, 2012). Novelty alone is insufficient; creative outputs must also be meaningful, useful, or valuable relative to the norms and constraints of a particular domain. From this perspective, creativity is not a spontaneous or purely intuitive act, but a cognitively structured process that unfolds within conceptual boundaries.

Within cognitive psychology, creativity is understood as an active mental process involving divergent thinking, associative flexibility, and executive control (Guilford, 1967; Sawyer, 2012). Divergent thinking enables individuals to generate multiple potential solutions, while executive functions such as working memory and inhibition support the evaluation and refinement of ideas. Creative cognition therefore requires sustained mental effort, internal idea generation, and the restructuring of knowledge rather than simple retrieval of stored information.

Recent theoretical discussions emphasize the distinction between **creative performance** and **creative cognition** (Lee et al., 2025). Creative performance refers to the observable quality or originality of an output, whereas creative cognition concerns the internal psychological and neural processes that produce that output. This distinction is particularly important in the context of generative artificial intelligence (GenAI). AI systems can produce outputs that appear highly creative according to external evaluation criteria, yet the cognitive processes underlying these outputs differ fundamentally from human ideation.

Generative AI operates primarily through probabilistic pattern recognition and large-scale recombination of learned data. As a result, AI can efficiently simulate certain aspects of creative production, particularly in terms of structured generation and idea variation. However, whether such systems engage in deeper forms of conceptual restructuring remains debated. This creates a theoretical tension: if creativity is defined primarily by output quality, AI-assisted production may appear equivalent to human creativity. If, however, creativity is understood as an effortful internal cognitive process involving restructuring, exploration, and intrinsic motivation, then delegating ideational tasks to AI systems raises important questions regarding the depth of human creative engagement.

Margaret Boden (1998) provides an influential theoretical framework by conceptualizing creativity as the exploration and transformation of structured conceptual spaces. Although AI systems can generate novel combinations within learned patterns, the extent to which they meaningfully transform conceptual structures remains contested. Boden's framework therefore offers a useful lens for evaluating how AI may influence not only creative products, but creative processes.

In the age of generative AI, creativity must therefore be examined at two levels simultaneously: the quality of the output produced and the nature of the cognitive engagement underlying its production. The central theoretical question is not simply whether AI can generate creative artifacts, but whether its integration reshapes the human cognitive processes that historically defined creative thought.

2.3 The Three Types of Creativity According to Boden (1998)

Margaret Boden's (1998) influential framework distinguishes three fundamental forms of creativity: combinational, exploratory, and transformational creativity. This tripartite model remains one of the most conceptually rigorous accounts of creative cognition and continues to shape contemporary discussions regarding the nature of originality, innovation, and, more recently, artificial intelligence. By conceptualizing creativity as the exploration and restructuring of "conceptual spaces," Boden provides a cognitive architecture through which creative acts can be systematically understood rather than mystified as spontaneous inspiration.

The first type, **combinational creativity**, involves the novel recombination of familiar ideas. Creative insight in this form emerges through unexpected yet meaningful associations between previously unrelated concepts. Poetic metaphors, interdisciplinary analogies, and cross-domain innovations frequently exemplify this mechanism. Importantly, combinational creativity is not random juxtaposition. It requires structural mapping, evaluative judgment, and sensitivity to contextual appropriateness. As Boden (1998) emphasizes, creators must detect deep relational similarities rather than superficial correspondences. This aligns with research in associative theory and analogical reasoning, which highlights the role of pattern recognition and semantic flexibility in creative cognition (Guilford, 1967; Sawyer, 2012). Although combinational creativity may appear effortless, it relies on complex cognitive processes including divergent thinking and executive evaluation.

The second type, **exploratory creativity**, involves the systematic investigation of an existing conceptual space. A conceptual space refers to the structured set of rules, constraints, and generative principles that define a domain of thought. Within this space, creativity emerges through pushing boundaries, refining constraints, and discovering possibilities that were implicit but not yet realized. Musicians operating within a specific genre, scientists working within a theoretical paradigm, or designers adhering to established stylistic conventions may engage in exploratory creativity by extending rather than overturning the governing structure. This form of creativity presupposes mastery of domain-specific knowledge and active engagement with inherited frameworks. It reflects depth of expertise and sustained cognitive immersion rather than radical disruption.

The third and most radical form, **transformational creativity**, occurs when the conceptual space itself is altered. Transformational creativity involves modifying, removing, or adding dimensions to the existing structure, thereby enabling ideas that were previously inconceivable within that system. Such transformations often provoke profound surprise or resistance because they challenge entrenched assumptions and cognitive expectations. Historically recognized paradigm shifts in science, art, or philosophy exemplify this level of creativity. Transformational acts are not merely novel—they redefine what counts as possible within a domain. As Boden (1998) notes, while the boundary between exploratory and transformational creativity may sometimes appear gradual, transformational creativity represents a qualitative reconfiguration rather than incremental refinement.

This theoretical distinction is especially relevant in the context of generative artificial intelligence. Most generative AI systems operate through large-scale statistical modeling and probabilistic recombination of patterns derived from existing data. From a theoretical standpoint, such processes closely resemble combinational creativity. AI systems can synthesize vast informational inputs and generate outputs that appear novel and contextually coherent. In some cases, they may facilitate exploratory creativity by assisting users in navigating complex conceptual spaces more efficiently.

However, whether generative AI can meaningfully engage in transformational creativity remains theoretically contested. Transformational creativity requires not only pattern generation but also intentional rule-breaking, contextual awareness, and evaluative reframing. AI systems operate within statistical boundaries learned from prior data and lack intrinsic goals or self-directed conceptual restructuring. Consequently, transformational shifts may depend fundamentally on human interpretation and critical reconfiguration rather than autonomous algorithmic operation.

This distinction carries important implications for understanding AI-mediated creativity. If AI primarily enhances combinational efficiency while users reduce engagement in exploratory or transformational processes, perceived creativity may increase at the level of output while deeper creative autonomy declines. Conversely, if AI functions as a cognitive catalyst that stimulates human exploratory thinking without replacing internal ideation, it may expand rather than diminish creative capacity.

Boden's framework therefore provides a theoretically robust lens for evaluating the impact of AI on creative cognition. It clarifies that creativity is not a unitary phenomenon but a multi-layered cognitive process involving different degrees of structural engagement. By distinguishing between recombination, exploration, and transformation, this model enables a more nuanced assessment of whether AI tools merely accelerate surface-level production or meaningfully interact with the deeper mechanisms of human creative thought.

2.4 Cognitive Load Theory and Cognitive Offloading

Cognitive Load Theory (CLT), originally proposed by Sweller (1988), provides a foundational framework for understanding how mental effort influences learning and higher-order cognition.

The theory distinguishes between three types of cognitive load: intrinsic load, which relates to the inherent complexity of a task; extraneous load, which stems from inefficient task presentation; and germane load, which refers to the cognitive effort invested in schema construction and meaningful learning. According to CLT, optimal learning requires the allocation of sufficient germane cognitive load — that is, active processing that strengthens and reorganizes mental structures.

From this perspective, cognitive effort is not merely a cost but a necessary condition for intellectual development. Deep understanding, critical reasoning, and creative problem-solving depend on sustained engagement with cognitively demanding material. Effortful processing facilitates integration of new information into existing schemas, thereby supporting long-term retention and transfer (Sweller, 1988).

The emergence of generative artificial intelligence introduces a novel variable into this framework. AI systems are capable of automating summarization, structuring, idea generation, and even complex analytical reasoning. In doing so, they may substantially reduce the cognitive load associated with information processing. The theoretical question that arises is whether such reduction primarily alleviates extraneous load — thereby enhancing efficiency — or whether it also diminishes germane load, potentially limiting deeper cognitive engagement.

This debate intersects with the concept of cognitive offloading. Cognitive offloading refers to the delegation of internal cognitive processes to external tools or environments (Clark & Chalmers, 1998). Everyday examples include writing notes to reduce memory demands or using calculators for arithmetic operations. Within this framework, AI systems can be conceptualized as advanced external cognitive supports that extend human reasoning capacities.

The Extended Mind thesis (Clark & Chalmers, 1998) further develops this argument by proposing that cognitive processes are not confined to the brain but may incorporate external artifacts when they functionally integrate into reasoning activity. From this perspective,

generative AI could be viewed as an external cognitive scaffold that augments human intellectual performance. By redistributing cognitive effort, AI may enable individuals to focus on higher-level evaluative or strategic tasks rather than lower-level procedural operations.

However, a competing theoretical concern emerges from research on neuroplasticity and the "use-it-or-lose-it" principle. Sustained engagement in effortful thinking strengthens neural pathways associated with executive functioning, working memory, and critical reasoning. Conversely, chronic underutilization of these systems may reduce cognitive robustness over time. If AI systems consistently assume tasks that previously required deep analytical engagement, the long-term developmental implications remain uncertain.

This tension reflects two competing interpretations of cognitive offloading. On one hand, offloading can be adaptive, allowing individuals to conserve limited cognitive resources and allocate effort more efficiently. On the other hand, excessive or habitual offloading of higher-order reasoning tasks may reduce opportunities for practicing complex mental operations. The distinction between domain-specific tools (e.g., calculators) and multi-domain AI systems is particularly relevant in this regard. Whereas calculators primarily support arithmetic computation, generative AI operates across reasoning, writing, creative ideation, and even emotional dialogue. The breadth and interactive depth of such systems raise qualitatively different theoretical questions about cognitive reliance (Dergaa et al., 2024).

Importantly, Cognitive Load Theory does not imply that lower cognitive load is always beneficial. While minimizing extraneous load enhances efficiency, reducing germane load may hinder schema development and critical thinking. Productive cognitive strain — often described in educational psychology as "desirable difficulty" — plays a vital role in intellectual growth. Thus, the central theoretical question is not whether AI reduces cognitive load, but which type of load is being reduced and how this reshapes mental effort allocation.

This dual framing underscores that AI's cognitive impact is not inherently positive or negative. Rather, it depends on how AI integration influences the balance between cognitive support and cognitive engagement. If AI primarily reduces extraneous load while preserving or even stimulating germane processing, it may function as an empowering cognitive amplifier. If, however, it systematically replaces effortful schema construction and deep reasoning, it may subtly reshape the developmental trajectory of higher-order cognition.

By integrating Cognitive Load Theory with cognitive offloading and the Extended Mind thesis, this framework allows the present study to conceptualize AI not merely as a technological tool, but as a structural modifier of mental effort. The key theoretical issue is whether frequent AI use redistributes cognitive labor in ways that preserve creative and analytical autonomy, or whether it gradually attenuates the internal processes that underlie independent thinking.

2.5 AI Dependency as a Psychological and Mediating Construct

AI dependency can be conceptualized as a psychological state characterized by habitual reliance on artificial intelligence systems for cognitive, evaluative, or creative tasks that were previously performed independently. Rather than referring merely to frequency of use, dependency reflects a shift in perceived competence, control, and problem-solving orientation. It involves a gradual reallocation of cognitive responsibility from the individual to the technological system.

From a theoretical standpoint, dependency may function as a mediating mechanism between AI-related beliefs (such as AI literacy and AI trust) and higher-order cognitive outcomes. AI literacy refers to an individual's knowledge and understanding of how AI systems function, while AI trust concerns the perceived reliability and usefulness of AI outputs. Although both constructs can facilitate effective tool use, they may also increase the likelihood that individuals defer cognitive effort to AI systems when faced with complex tasks.

The mediating perspective suggests that literacy and trust do not directly diminish higher-order skills. Instead, they shape behavioral reliance patterns. When individuals perceive AI as highly capable, efficient, or superior in performance, they may increasingly outsource analytical reasoning, ideation, and evaluative judgment to the system. Over time, such patterns may influence the development and maintenance of critical thinking, creative engagement, and independent problem-solving capacity.

In this sense, dependency represents not merely technological usage, but a transformation in cognitive orientation. The individual transitions from being the primary generator of ideas to functioning as a curator, validator, or supervisor of AI-generated content. This shift may subtly

alter perceptions of self-efficacy and intellectual ownership, particularly in creative contexts where autonomy and internal ideation are central.

The mediating framework also aligns with broader motivational theories, including Self-Determination Theory (Deci & Ryan, 2000), which emphasize autonomy and competence as foundational psychological needs. When success is increasingly attributed to AI assistance rather than internal capability, perceived competence may become externally anchored.
Similarly, autonomy may be reframed from originating ideas independently to selecting among algorithmically generated options.
Importantly, conceptualizing dependency as a mediator avoids simplistic causal assumptions. It acknowledges that AI literacy and trust are not inherently detrimental; indeed, they may be essential for responsible and effective AI integration. However, when these factors foster habitual reliance without reflective engagement, dependency may emerge as the psychological pathway through which cognitive autonomy becomes attenuated.

Thus, AI dependency can be understood as a structurally significant construct within the present framework. It links technological engagement to potential changes in critical thinking, creative cognition, and self-confidence. Rather than focusing solely on frequency of AI use, this conceptualization highlights the importance of examining how individuals integrate AI into their cognitive routines and how such integration shapes long-term intellectual development.

2.6 The I-PACE Model and the Development of AI Dependency

To further conceptualize AI dependency as a psychologically structured process rather than mere behavioral frequency, the present study draws upon the Interaction of Person–Affect–Cognition–Execution (I-PACE) model (Brand et al., 2016). Originally developed to explain the development of problematic technology use, the I-PACE model provides a dynamic framework for understanding how individual characteristics, emotional states, cognitive appraisals, and behavioral execution interact over time to produce patterns of reliance.

The I-PACE model proposes that problematic or excessive technology use does not arise from exposure alone, but from the interaction of four core components. First, *person variables* include relatively stable individual characteristics such as personality traits, self-efficacy beliefs, and prior experiences. Second, *affective responses* encompass emotional states such as

stress, anxiety, or frustration. Third, *cognitive responses* involve expectations, beliefs, and perceived benefits associated with technology use. Finally, *execution* refers to the actual behavioral implementation of technology engagement.

Applied to the context of generative AI, this framework suggests that dependency may emerge when personal vulnerabilities or situational pressures interact with cognitive beliefs about AI's effectiveness. For instance, individuals with lower perceived academic or professional competence may experience heightened stress in performance-driven environments. Under such affective strain, AI systems may be cognitively reframed as efficient coping tools capable of reducing uncertainty and improving output quality. Repeated reliance in such contexts may gradually solidify into habitual dependency.

Crucially, the I-PACE model emphasizes that dependency is not reducible to usage frequency alone. Instead, it represents the outcome of psychologically mediated processes in which emotional regulation, performance expectations, and self-perception converge. In high-pressure academic or professional settings, AI may function as a compensatory mechanism, providing immediate relief from cognitive strain. Over time, this coping function may reinforce reliance patterns, particularly if AI-assisted performance yields positive reinforcement.

This interpretation aligns with broader motivational theories discussed earlier, particularly Self-Determination Theory (Deci & Ryan, 2000). When individuals increasingly attribute successful task completion to AI assistance rather than internal competence, perceived autonomy and intrinsic motivation may be subtly reshaped. The I-PACE model complements this perspective by explaining how such shifts can be reinforced through affective and cognitive feedback loops. Importantly, the I-PACE framework conceptualizes dependency as a dynamic process rather than a fixed trait. It highlights that technology reliance develops through iterative interactions between internal psychological states and external technological affordances. In the case of AI, dependency may be strengthened not only by the tool's functional efficiency but also by the emotional reassurance and performance optimization it provides.

Integrating the I-PACE model into the present theoretical framework allows AI dependency to be understood as a psychologically mediated phenomenon shaped by self-efficacy beliefs, stress responses, cognitive expectations, and repeated behavioral reinforcement. Rather than viewing AI dependency as simple overuse, this model situates it within a structured system of person–

environment interactions that may influence cognitive autonomy and creative engagement over time.

4. Literature Review

3.1 Creativity in the Context of Generative AI

The rapid integration of generative artificial intelligence (GenAI) into academic and professional environments has fundamentally reshaped contemporary discussions surrounding creativity. While traditional creativity research emphasizes human originality, imagination, and internal cognitive restructuring (Boden, 1998), generative AI challenges long-standing assumptions regarding authorship, agency, and idea generation.

Recent scholarship increasingly conceptualizes creativity in AI-mediated environments as a form of *hybrid cognition* rather than purely human production (Generative AI and Creativity, 2024). In such hybrid systems, idea generation may originate in algorithmic processes, while evaluateon, contextualization, and refinement remain human responsibilities. This redistribution of cognitive labor blurs the boundary between creator and tool, complicating classical definitions of creativity grounded in individual ideation.

Rana et al. (2025) extend this discussion by framing AI-mediated learning as distributed cognition. Within distributed cognitive systems, agency is shared across human and technological actors. While such arrangements may enhance productivity and ideation breadth, they also challenge traditional notions of autonomy and authorship. Creative outputs become co-produced artifacts, raising questions about the locus of originality and ownership.

Critics argue that generative AI's creative capacity is fundamentally combinational, operating through probabilistic recombination of existing data rather than genuine insight or intentional transformation (From Tools to Threats, 2024). From this perspective, AI may simulate creativity without engaging in authentic conceptual restructuring. This debate between augmentation and authenticity forms the conceptual backdrop of contemporary AI-creativity research.

3.2 Empirical Evidence for AI-Enhanced Creativity

A growing body of empirical research documents measurable creative enhancement under AI-assisted conditions. Holzner, Maier, and Feuerriegel (2025), in a large-scale meta-analysis synthesizing 28 experimental studies (N = 8,214), report that human–AI collaboration significantly improves creative task performance compared to human-only conditions (g = 0.27). Interestingly, AI-generated outputs alone performed comparably to human-generated outputs, suggesting that generative systems can approximate human-level creativity in certain standardized tasks.

However, the same meta-analysis identified a significant reduction in idea diversity during human–AI collaboration (g = –0.86). While performance ratings increased, the breadth of divergent exploration narrowed. This finding suggests that AI may enhance perceived quality and efficiency while potentially constraining creative variability.

Hwang and Wu (2025) provide additional support for augmentation effects within educational contexts. Their mediation analysis indicates that generative AI enhances innovative thinking indirectly through increased self-efficacy and reduced creative anxiety. AI may therefore function as a psychological scaffold, lowering barriers to ideation and increasing confidence during early conceptual stages.

Similarly, Rana and Verhoeven (2025), examining generative AI in design pedagogy, found that AI tools effectively supported ideation during early phases of creative development. Students experiencing creative blocks reported that AI-generated suggestions stimulated further refinement rather than replacing human judgment. In such cases, AI operated as a stimulus generator rather than a substitute for cognitive engagement.

Chain mediation research by Zhang et al. (2024) further suggests that AI influences creativity indirectly via reductions in academic stress and increases in perceived performance capability. When AI lowers anxiety associated with task demands, creative cognition may be facilitated. However, these enhancement effects are predominantly observed in short-term experimental tasks. Longitudinal durability remains uncertain. Moreover, improvements in output quality do not necessarily indicate deeper cognitive restructuring or long-term creative development.

3.3 Cognitive Engagement, Effort Reduction, and Neural Evidence

Contrasting augmentation findings, a growing body of literature raises concerns regarding reduced cognitive engagement during AI-assisted tasks.

Lee et al. (2025), in a survey of 319 knowledge workers, found that higher confidence in generative AI predicted reduced enactment of critical thinking during AI-assisted tasks. Individuals who strongly trusted AI systems engaged less in analytical evaluation, suggesting that perceived reliability may reduce cognitive scrutiny.

Experimental evidence further strengthens this concern. Kosmyna et al. (2025), using EEG methodology in a longitudinal essay-writing study, observed significantly reduced neural connectivity in participants using large language models compared to those writing independently. Neural engagement scaled inversely with level of external support, with AI-assisted participants exhibiting the weakest network coupling. Notably, when participants previously reliant on AI were later required to write without assistance, neural connectivity did not fully return to baseline levels. The authors describe this phenomenon as potential "cognitive debt," characterized by reduced activation in networks associated with memory integration and executive control.

Behavioral measures in the same study revealed diminished memory recall and lower perceived authorship among AI-assisted participants. These findings suggest that while AI may increase fluency and short-term productivity, it may reduce internal knowledge consolidation.
Ejaz, Farhan, and Alessi Longa (2025), surveying 350 university students, found that AI usage significantly reduced perceived cognitive load ($\beta = –0.37$, $p < .01$). However, lower cognitive load was simultaneously associated with slightly reduced self-reported critical thinking ($\beta = –0.21$, $p < .05$). Interestingly, cognitive load itself positively predicted critical thinking ability ($\beta = .45$, $p < .001$), suggesting that certain levels of mental strain may be necessary for deeper analytical reasoning.

Chen et al. (2025) critique what they term the "standard assessment paradigm" (SAP), in which AI effects are evaluated solely through final task outcomes. Their randomized controlled study

incorporates pupillometry and functional near-infrared spectroscopy (fNIRS) to measure real-time cognitive effort. They argue that understanding AI's impact requires process-level measurement rather than static product evaluation.

Together, these findings suggest that AI may redistribute cognitive effort rather than eliminate it entirely. However, repeated delegation of higher-order reasoning may alter long-term engagement patterns.

3.4 Cognitive Dependency and Automation Bias

Beyond immediate cognitive effort, researchers increasingly examine the emergence of AI dependency. Dergaa et al. (2024) introduce the concept of AI-Chatbot-Induced Cognitive Atrophy (AICICA), proposing that persistent delegation of analytical reasoning to AI systems may lead to gradual underutilization of neural circuits responsible for higher-order thinking. Drawing on the "use-it-or-lose-it" principle of neuroplasticity (Shors et al., 2012), the authors argue that sustained cognitive outsourcing may weaken internal problem-solving processes.

Unlike earlier digital tools such as calculators, generative AI systems operate across multiple domains, including reasoning, ideation, and emotional dialogue. Their conversational and personalized nature may foster deeper psychological attachment.
Automation bias further compounds this risk.describes automation bias as the tendency to overtrust algorithmic outputs and reduce independent verification. Fluent and authoritative AI-generated responses may decrease epistemic vigilance.

Parallels can be drawn with the "Google effect" (Sparrow et al., 2011), whereby individuals demonstrate reduced memory retention when information is externally stored. AI systems extend this phenomenon from factual recall to complex reasoning and creative production.

However, dependency is not inevitable. Rana et al. (2025) demonstrate that pedagogically scaffolded AI use can strengthen epistemic vigilance. Students trained to critically evaluate AI outputs engaged in structured validation behaviors, including fact-checking and bias detection. This suggests that cognitive stance—rather than frequency alone—may determine whether AI fosters dependency or reflective engagement.

3.5 Psychological Dependency, Trust, and Emotional Reliance

AI dependency extends beyond cognitive outsourcing into psychological domains.
Zhang et al. (2025), using structural equation modeling with 469 preservice mathematics teachers, found that AI literacy ($\beta = 0.505$, $p < .001$) and AI trust ($\beta = 0.374$, $p < .001$) significantly predicted AI dependency. Importantly, dependency negatively predicted critical thinking, creative thinking, problem-solving, communication, collaboration, and self-confidence.

Zhang et al. (2024) further demonstrate that academic stress and performance expectations toward AI indirectly contribute to dependency. AI may function as a coping mechanism in high-pressure environments.

Longitudinal research by Fang et al. (2025) found that frequent chatbot use predicted increased emotional attachment and reduced real-world social interaction over time. Similarly, Naseer, Ahmad, and Chishti (2025) report associations between prolonged AI reliance and reduced decision-making confidence, emotional stress, and professional anxiety.

These findings suggest that dependency reflects subjective necessity rather than simple usage frequency. It involves perceived inability to perform tasks independently.

3.6 Moderating Variables: AI Literacy and Self-Efficacy

Emerging evidence indicates that individual differences moderate AI outcomes.
AI literacy appears to function ambivalently. While literacy enhances understanding of AI limitations, higher literacy levels also correlate with increased dependency in some contexts (Zhang et al., 2025). Familiarity may increase reliance when users perceive AI as highly effective.

Self-efficacy also plays a complex role. Zhang et al. (2024) show that AI reduces anxiety and increases perceived competence. However, inflated competence not grounded in internal mastery may create fragile confidence structures.
Thus, frequency of use alone cannot explain cognitive or creative outcomes. Psychological interpretation and skill orientation likely shape impact.

3.7 Methodological Tensions in Existing Research

The literature reveals significant methodological tensions.

First, many studies rely on short-term laboratory tasks, limiting ecological validity. Second, heavy-user populations are often examined rather than moderate everyday users. Third, constructs such as creativity, dependency, and cognitive load are frequently studied in isolation.
Fourth, product-based assessment dominates over process-based measurement (Chen et al., 2025).

Finally, augmentation effects appear task-specific; Holzner et al. (2025) report stronger AI performance in divergent thinking tasks than in complex creative writing contexts.

These methodological patterns complicate generalized claims about AI's cognitive and creative implications.

3.8 Synthesis and Research Gap

The existing literature presents a dual narrative: AI as cognitive amplifier versus AI as cognitive shortcut.

Empirical evidence supports both perspectives depending on context, task type, user orientation, and measurement strategy. While AI frequently enhances short-term creative performance, emerging evidence suggests potential reductions in deep cognitive engagement and increased psychological reliance under certain conditions.

However, there remains limited quantitative research examining whether simple frequency of AI use in natural university settings correlates with perceived creativity reduction, cognitive dependency, and creative confidence within young adult populations.

Few studies integrate these constructs within a single correlational framework. Moreover, moderate everyday usage patterns remain underexplored compared to experimental manipulations or heavy-use samples.

This present study addresses this gap by examining the relationships between AI usage frequency, perceived creativity reduction, cognitive dependency, and creative confidence within a naturalistic academic sample of young adults aged 20–35.

4.Methodology

This chapter outlines the methodological framework employed to investigate the relationship between artificial intelligence (AI) usage frequency and perceived creativity, cognitive dependency, and creative self-confidence among young adults aged 20–35. The study adopts a quantitative research design to enable systematic measurement of psychological constructs and statistical examination of associations between variables.

A cross-sectional survey approach was selected as it allows for the collection of standardized data from a defined population within a naturalistic context. Quantitative designs are particularly appropriate when the objective is to examine relationships between measurable constructs using statistical analysis (Creswell & Creswell, 2018). Given that the present study aims to assess correlations between AI usage frequency and psychological outcomes, a survey-based method provides an efficient and theoretically aligned approach.

The following sections describe the research design, participant characteristics, survey instrument, operationalization of variables, data analysis strategy using SPSS, and ethical considerations.

4.1 Research Design

This study applied a quantitative, cross-sectional, correlational research design to examine the relationship between Artificial Intelligence (AI) usage frequency and perceived effects on creativity, cognitive dependency, and creative self-confidence among young adults aged 20–35.

A quantitative approach was selected because the primary objective of this study was to identify measurable relationships between clearly defined psychological constructs. Quantitative methodology enables the systematic collection of standardized data and allows for statistical examination of associations between variables. By operationalizing AI usage frequency and psychological perceptions into numerical scales, the study aims to provide empirical clarity to an ongoing theoretical debate.

The research design was non-experimental in nature. No variables were manipulated, and participants were not randomly assigned to conditions. Instead, the study measured naturally occurring patterns of AI use and self-reported perceptions at a single point in time. This correlational approach allows examination of statistical relationships while acknowledging that causal inferences cannot be drawn. The goal was not to determine whether AI usage causes changes in creativity or dependency, but rather to assess whether significant associations exist within a real-world academic context.

A cross-sectional design was chosen due to both conceptual and practical considerations. Conceptually, the study sought to capture habitual AI usage patterns as they occur in everyday life rather than under controlled laboratory manipulation.

Experimental designs are valuable for isolating short-term cognitive effects; however, they often lack ecological validity when investigating technologies embedded in daily routines. Because generative AI tools are used continuously across academic and professional tasks, a naturalistic survey design was considered more appropriate for examining perceived long-term patterns of use.

Practically, a cross-sectional survey enabled data collection from multiple participants within a limited timeframe. Given the exploratory nature of this research question and the absence of

extensive prior correlational studies in this area, the present design provides an initial empirical foundation for future longitudinal or experimental investigations.

While longitudinal designs would allow stronger conclusions regarding temporal development of dependency or creativity changes, such approaches require extended data collection periods beyond the scope of this study. Therefore, a correlational cross-sectional framework was selected as a methodologically appropriate first step in mapping the psychological landscape surrounding AI use among young adults.

By focusing on naturally occurring usage frequency and perceived cognitive outcomes, this design prioritizes ecological validity and real-world relevance. The findings are intended to inform future experimental, longitudinal, or mixed-method research by identifying statistically meaningful relationships that warrant deeper causal examination.

4.2 Sample and Participants

The final sample consisted of 39 participants aged between 20 and 35 years. All participants were students or young adults in Ulm and Neu-Ulm,Germany, at the time of data collection. Although participants represented diverse national backgrounds, they were all studying, working, or residing in Ulm during the study period, ensuring a shared academic and socio-cultural environment.

Participants were recruited using multiple distribution channels in order to increase accessibility and participation rates. Recruitment strategies included:

- University-wide email distribution lists targeting enrolled students
- Posters displayed on campus containing a QR code linking directly to the online survey
- Direct email distribution within student residential buildings

The survey was administered online to facilitate ease of participation and to align with the digitally engaged nature of the target population. Participation was voluntary, and no financial or academic incentives were provided.

The sampling strategy can be characterized as non-probability convenience sampling. Participants self-selected into the study after exposure to recruitment materials. While this approach limits generalizability beyond the sampled population, it is appropriate for exploratory correlational research focused on naturally occurring behaviors within a specific context.

The selected population is particularly relevant for the research objectives of this study. University students and working students represent a digitally active demographic that frequently interacts with generative AI tools for academic assignments, professional tasks, and creative projects. This makes them an appropriate group for examining patterns of AI usage frequency and perceived cognitive outcomes.

Although the sample size (N = 39) is relatively small, it remains sufficient for detecting medium to large effect sizes in correlational analyses. Given the exploratory nature of this study and its focus on identifying potential associations rather than establishing causal relationships, the sample provides an adequate empirical basis for initial investigation. Nevertheless, statistical power is limited, and findings should be interpreted cautiously, particularly in the case of non-significant results.

The present study was designed as an initial empirical examination within a naturalistic young adult academic population. Rather than aiming for broad population generalization, the focus was placed on precise construct measurement and internal consistency of scales. Future research with larger and more diverse samples would be necessary to confirm and extend the findings.

4.3 Survey Instrument

Data were collected using a structured online questionnaire administered via Google Forms. An online format was selected to facilitate accessibility, ensure anonymity, and accommodate the digitally active target population. The survey consisted exclusively of closed-ended questions

in order to enable quantitative measurement, standardized response formats, and statistical analysis of relationships between variables.

The questionnaire was divided into ten thematic sections designed to capture AI usage patterns and associated psychological perceptions:

- Types of AI tools used (multiple selection)
- Purpose of AI use (multiple selection)
- Reasons for AI use (multiple selection)
- Self-perceived creativity before AI use (Likert scale 1–5)
- Frequency of AI usage (single-choice scale)
- Perceived effects on creativity and independent thinking (Likert scale 1–5)
- Motivation and mental effort (Likert scale 1–5)
- Creative confidence and social comparison (Likert scale 1–5)
- Positive attitudes toward AI (Likert scale 1–5)
- Demographic variables (age, gender, employment status, field of study/work)

The use of closed-ended items ensured comparability across respondents and minimized vagueness in interpretation. This approach is consistent with quantitative correlational research designs aimed at examining associations between defined constructs.

Measurement Scales

Most attitudinal items were measured using a 5-point Likert scale ranging from:

1 = Strongly disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly agree

The Likert format was selected because it allows for measurement of subjective perceptions while maintaining ordinal structure suitable for parametric statistical analysis when aggregated into composite scales.

AI usage frequency was measured using a 5-point ordinal scale:
1 = Never
2 = Rarely
3 = A few times a month
4 = A few times a week
5 = Daily

This operationalization captures habitual engagement patterns rather than isolated use. Multiple-selection questions (e.g., AI tools used, purposes of use) were coded using binary dummy variables (0 = not selected, 1 = selected). This allowed descriptive analysis of usage patterns without interfering with scale construction for psychological constructs.

Operationalization of Constructs

All key psychological constructs were operationalized using multi-item scales. Rather than relying on single-item indicators, composite scale means were calculated to represent:

- Creativity reduction
- Cognitive dependency
- Creative confidence
- Positive attitude toward AI

Composite scales were created by calculating the arithmetic mean of relevant items within each construct. This approach reduces random measurement error, increases reliability, and provides more stable estimates of latent psychological variables compared to single-item measures.

Internal consistency reliability was assessed using Cronbach's alpha coefficients. Reliability values ranged from $\alpha = .71$ to $\alpha = .82$, indicating acceptable to strong internal consistency according to conventional thresholds ($\alpha \geq .70$). These results suggest that items within each scale measured coherent underlying constructs.

By employing multi-item scales with acceptable reliability and standardized response formats, the survey instrument was designed to ensure construct validity and statistical comparability across participants.

4.4 Operationalization of Variables

The study included one independent variable and multiple dependent constructs.

Independent Variable

AI Usage Frequency (ai_use_freq)

Measured on a 5-point scale (1 = Never to 5 = Daily).

Dependent Variables

To simplify analysis and increase clarity, composite scale means were created in SPSS by averaging relevant items.

Creativity Reduction (creativity_mean)

This variable included items such as:

- “AI gives me ideas faster than I can think of them myself.”
- “Since using AI, I spend less time thinking creatively on my own.”
- “I use AI even for tasks I previously did independently.”

Higher values indicate stronger perceived reduction in independent thinking.

Cognitive Dependency (dependency_mean)

This scale included items such as:

- “I use AI because it reduces the mental effort required.”
- “I feel less motivated to brainstorm independently.”
- “I sometimes feel dependent on AI tools to begin or complete tasks.”

Higher scores indicate greater perceived dependency.

Creative Self-Confidence (confidence_mean)

This included items such as:

- “AI-generated content appears more polished than my own ideas.”
- “I feel less confident in my ideas when comparing them to AI-generated results.”

Higher scores reflect lower perceived creative confidence.

Positive Attitudes Toward AI (positive_mean)

This included items measuring perceived enhancement and appropriate integration of AI into creative processes.

Composite variables were calculated using the Compute Variable function in SPSS by averaging relevant items.

4.5 Data Analysis Strategy

Data were exported from Google Forms to Microsoft Excel and then imported into IBM SPSS Statistics.

The analysis consisted of three main steps:

1. Descriptive Statistics
   Frequencies were calculated for demographic variables (age, gender, employment, field of study).
   Means and standard deviations were calculated for all key variables.
2. Reliability Preparation
   Items measuring similar constructs were grouped and averaged to create composite scale means.
3. Correlation Analysis
   Pearson correlation analysis was conducted to examine relationships between AI usage frequency and:

- Creativity reduction
- Cognitive dependency
- Creative self-confidence

Pearson's was selected because the variables were measured on interval-level Likert scales and the goal was to assess linear relationships between continuous variables.

Statistical significance was evaluated at the conventional threshold of $p < .05$.
The analysis was conducted using SPSS.

4.6 Ethical Considerations

Participation in the study was voluntary and anonymous. No identifying personal data were collected. Participants were informed that the survey was part of a Master's thesis and that responses would be used solely for academic purposes.
The survey did not include sensitive personal information. Data were stored securely and analyzed in aggregated form.

Participants had the option to withdraw from the survey at any time before submission. By completing the survey, participants provided informed consent.

5. Results

5.1 Sample Characteristics (Frequencies table)

To describe the demographic composition of the sample, frequency analyses were conducted for age, gender, employment status, and field of study/work. The final sample consisted of 39 participants aged between 20 and 35 years.

Regarding age distribution, the largest age group was 25–29 years (43.6%), followed by 20–24 years (35.9%), and 30–35 years (20.5%). This indicates that the majority of participants were in their mid-to-late twenties.

In terms of gender, 66.7% of participants identified as female, while 33.3% identified as male. No additional gender categories were selected.

Concerning employment status, most participants were working students (43.6%) or students not currently employed (41.0%). A smaller proportion were employed full-time (12.8%), and 2.6% selected “Other.”

Participants represented diverse academic and professional backgrounds. The largest group came from Media/Communication (33.3%), followed by Business/Economics (28.2%) and IT/Computer Science (15.4%). Smaller percentages were distributed across other fields.
Overall, the sample primarily consisted of female university students or working students in their mid-twenties, which aligns with the target population of digitally active young adults.

Table 1:

Sample Characteristics (N = 39)

Variable	Category	n	%
Age	20-24	14	35.9
	25-29	17	43.6
	30-45	8	20.5
Gender	Female	26	66.7
	Male	13	33.3
Employment	Student	16	41.1
	Working studnet	17	43.6
	Employed	5	12.8
	Other	1	2.6

5.2 Descriptive Statistics of Main Variables

Descriptive Statistics

Descriptive statistics were calculated for AI usage frequency and the four composite scales. Participants reported very frequent AI usage (M = 4.69, SD = 0.52).

Creativity reduction showed a moderate mean (M = 3.36, SD = 0.77), suggesting moderate perceptions of reduced independent thinking. Cognitive dependency also displayed moderate levels (M = 3.61, SD = 0.86). Creative confidence had a mean of 3.26 (SD = 0.93), indicating moderate perceived impact on confidence. In contrast, positive attitudes toward AI were relatively high (M = 4.11, SD = 0.70), reflecting strong agreement that AI can enhance creativity when used appropriately.

Table2

Descriptive Statistics of Main Study Variables (N = 39)

Variable	M	SD
AI usage frequency	4.69	0.52
Creativity reduction	3.36	0.77
Cognitive dependency	3.61	0.86
Creative confidence	3.26	0.93
Positive attitude toward AI	4.11	0.70

Reliability Analysis

Cronbach's alpha coefficients were calculated to assess internal consistency of the constructed scales. The creativity reduction scale demonstrated acceptable reliability (α = .71, 5 items). The cognitive dependency scale showed good internal consistency (α = .79, 8 items). The creative confidence scale demonstrated acceptable reliability (α = .71, 4 items), and the positive attitude toward AI scale showed strong reliability (α = .82, 6 items). All scales exceeded the commonly accepted threshold of α = .70.

Table 3 : *Reliability of Study Scales*

Scale	A	Items
Creativity reduction	.71	5
Cognitive dependency	.79	8
Creative confidence	.71	4
Positive attitude toward AI	.82	6

5.3 Correlation Analysis

Pearson correlation analysis was conducted to examine the relationships between AI usage frequency and the main psychological constructs: creativity reduction, cognitive dependency, and creative self-confidence.

The analysis revealed no statistically significant correlation between AI usage frequency and creativity reduction, $r = .129$, $p = .432$. Therefore, H1 was not supported.

Similarly, no significant association was found between AI usage frequency and cognitive dependency, $r = .227$, $p = .164$. Thus, H2 was not supported.

AI usage frequency was also not significantly related to creative self-confidence, $r = .018$, $p = .915$. Accordingly, H3 was not supported.

Although AI usage frequency was not significantly associated with the dependent constructs, significant relationships were observed among the psychological variables themselves. Creativity reduction was strongly and positively correlated with cognitive dependency, $r = .672$, $p < .001$, indicating that participants who perceived lower independent thinking also reported higher dependency on AI tools.

Additionally, creativity reduction was moderately correlated with reduced creative confidence, $r = .363$, $p = .023$, suggesting that individuals who felt less creative also reported lower confidence in their own ideas.

These findings indicate that while frequency of AI usage alone was not statistically related to perceived negative outcomes, subjective perceptions of creativity reduction were strongly associated with dependency and confidence levels.

Table 4

Pearson Correlations Between Study Variables (N = 39)

Variable	1	2	3	4	5
1. AI usage frequency	—				
2. Creativity reduction	. 13	—			
3. Cognitive dependency	. 23	.67***	—		
4. Creative confidence	.02	.36*	.25	—	
5. Positive attitude toward AI	−.02	−.18	.09	.28	—

Note. *p < .05, ***p < .001.

5.4 Hypothesis Testing

To test the proposed hypotheses, Pearson correlation analyses were conducted using SPSS. The significance level was set at α = 0.05. The results are presented in Table 3.

Hypothesis One (H1)

Hypothesis Text:
Higher AI usage frequency is associated with reduced independent thinking and creativity.
Test Used:
Pearson Product-Moment Correlation.
Table:
Table 3. Pearson Correlations Between AI Usage Frequency and Main Study Variables (N = 39)

Result:

The correlation between AI usage frequency and creativity reduction was not statistically significant, $r = .129$, $p = .432$.

Decision:

Since $p = .432$ is greater than $\alpha = .05$, the null hypothesis cannot be rejected. Therefore, H1 is not supported.

Interpretation:

There is no statistically significant relationship between AI usage frequency and perceived reduction in independent thinking in this sample. This suggests that frequent AI use alone does not necessarily correspond with lower creativity or independent cognitive engagement.

Hypothesis Two (H2)

Hypothesis Text:

Higher AI usage frequency is associated with increased cognitive dependency.

Test Used:

Pearson Product-Moment Correlation.

Result:

The correlation between AI usage frequency and cognitive dependency was not statistically significant, $r = .227$, $p = .164$.

Decision:

Since $p = .164$ exceeds $\alpha = .05$, H2 is not supported.

Interpretation:

Although the relationship was positive, it did not reach statistical significance. This indicates that within this sample, more frequent AI use was not significantly associated with higher levels of perceived dependency.

Hypothesis Three (H3)

Hypothesis Text:

Higher AI usage frequency is associated with lower creative self-confidence.

Test Used:

Pearson Product-Moment Correlation.

Result:

The correlation between AI usage frequency and creative self-confidence was not statistically significant, $r = .018$, $p = .915$.

Decision:

Since $p = .915$ is substantially greater than $\alpha = .05$, H3 is not supported.

Interpretation:

AI usage frequency was not significantly related to creative self-confidence. Frequent users did not report significantly lower confidence in their own ideas compared to less frequent users.

Additional Observations

Although the hypotheses focusing on AI usage frequency were not supported, significant relationships were observed among the psychological constructs themselves.

Creativity reduction was strongly and positively correlated with cognitive dependency, $r = .672$, $p < .001$.

Creativity reduction was also moderately correlated with reduced creative confidence, $r = .363$, $p = .023$.

These findings suggest that perceptions of reduced creativity are closely associated with feelings of dependency and lower confidence, even though usage frequency itself was not a significant predictor.

Justification of Statistical Tests

The primary objective of this study was to examine whether AI usage frequency is statistically associated with perceived changes in creativity, dependency, and confidence. Because the hypotheses focused on relationships between continuous variables measured on Likert scales, Pearson's product-moment correlation coefficient was selected.

Pearson correlation is appropriate when examining linear associations between interval-level variables. In this study, AI usage frequency was measured on a 5-point scale, and composite scale means for creativity reduction, dependency, and confidence were calculated as continuous variables. Therefore, correlation analysis allowed assessment of the strength and direction of relationships between these variables.

Alternative statistical methods such as independent samples t-tests or ANOVA were not suitable, as the study did not aim to compare distinct groups but rather to assess associations across the entire sample. Regression analysis was also not necessary, as the study did not aim to predict outcomes or establish causal relationships but to explore correlational patterns.
Given the relatively small sample size (N = 39), Pearson correlation provided a statistically appropriate and methodologically consistent approach for testing the proposed hypotheses.

5.5 Interpretation of the Relationship Between Creativity Reduction and Cognitive Dependency

The primary finding of this study was the strong and statistically significant positive correlation between perceived creativity reduction and cognitive dependency on AI tools ($r = .672$, $p < .001$). This indicates that participants who reported lower levels of independent thinking and creative engagement also reported higher levels of psychological reliance on AI systems. While AI usage frequency itself was not significantly associated with the examined constructs, subjective perceptions of reduced creativity were closely intertwined with feelings of dependency.

From a Self-Determination Theory (SDT) perspective, this relationship may reflect a shift in perceived autonomy and competence. Although AI tools can enhance productivity and provide structured support, heavy cognitive reliance may gradually reduce the individual's sense of being the primary agent of idea generation. In SDT terms, creative behavior may shift from intrinsically motivated engagement toward a more externally regulated or tool-dependent mode of functioning. Over time, this could weaken the internalization of creative competence and reduce perceived ownership of cognitive output.

This dynamic aligns with what may be conceptualized as a "Confidence–Dependency Trap." Individuals may feel more creative when using AI tools due to the fluency and quality of generated output, yet this perceived enhancement may simultaneously increase psychological dependency on the tool. In such cases, creativity becomes contingent upon AI assistance rather than internal cognitive effort.

The present findings align with emerging neurocognitive evidence suggesting that AI-assisted writing may reduce deep cognitive engagement. Experimental EEG research has demonstrated that LLM users exhibit significantly weaker neural connectivity during essay-writing tasks compared to individuals writing without AI assistance . In this longitudinal study, neural connectivity systematically decreased with increasing levels of external technological support. Furthermore, participants who previously relied on LLMs showed reduced memory recall and lower perceived ownership of their essays, even when later writing without AI assistance . These findings suggest that while AI tools may enhance short-term efficiency, repeated reliance may lead to reduced cognitive integration and memory encoding. When considered alongside the strong association observed in the present study between creativity reduction and dependency, these results raise the possibility that subjective confidence gains may coexist with diminished internal cognitive processing.

Taken together, the findings suggest that the psychological experience of reduced creativity is closely connected to reliance patterns rather than mere frequency of AI usage. This distinction is important, as it indicates that how AI is used—and how individuals perceive its role in their thinking—may matter more than how often it is used.

The observed strong association between perceived creativity reduction and cognitive dependency in the present study may be conceptually linked to the homogenization effects identified in prior meta-analytic research. Holzner et al. (2025) report a substantial reduction in idea diversity during human–AI collaboration ($g = -0.86$), suggesting that while individual output quality may increase, ideational breadth may narrow . Such convergence effects may foster efficiency while subtly constraining exploratory cognitive processes.

Non-Significant Findings Regarding AI Usage Frequency

Contrary to the proposed hypotheses, AI usage frequency was not significantly associated with creativity reduction, cognitive dependency, or creative self-confidence. These findings suggest that frequency alone may not be a sufficient predictor of psychological impact. Rather than the amount of AI use, qualitative aspects of engagement—such as reliance patterns, task type, or motivational orientation—may be more relevant determinants of cognitive and creative outcomes.

This aligns with recent research indicating that AI tools can function either as cognitive scaffolds or cognitive substitutes, depending on user intention and level of engagement.

Moderate and strategic use may support idea exploration, whereas substitution of internal thinking processes may foster dependency without measurable frequency differences.

5.6 Theoretical Implications

The results contribute to the growing body of literature examining AI use through the lenses of Cognitive Offloading Theory and Self-Determination Theory. Cognitive Offloading Theory suggests that delegating cognitive processes to external tools reduces mental effort and working memory demands. While such reduction may increase efficiency, it may also limit opportunities for deep processing and schema construction.

Within the SDT framework, excessive reliance on AI may threaten the psychological need for autonomy if individuals begin to perceive the tool as the primary source of idea generation. Similarly, perceived competence may become externally anchored in AI-assisted performance rather than internally grounded skill development. Over time, this may alter how creativity is experienced and defined, shifting from original ideation toward effective curation of AI outputs. The integration of behavioral self-report findings with neurocognitive evidence strengthens the theoretical argument that AI use represents not merely a technological shift, but a potential transformation in cognitive engagement patterns.

5.7 Practical Implications

For educational and professional contexts, the findings suggest that AI tools should be framed as augmentation instruments rather than cognitive replacements. Encouraging reflective use, critical evaluation of AI-generated outputs, and structured integration with independent thinking may help mitigate dependency risks.

Developing AI literacy programs that emphasize agency, verification, and strategic prompting may help users maintain autonomy while benefiting from technological efficiency. The goal should not be avoidance of AI, but preservation of active cognitive engagement.

5.8 Limitations and Future Research

Several limitations of the present study must be acknowledged when interpreting the findings. First, the relatively small sample size (N = 39) limits the statistical power and generalizability of the results. Although Pearson correlation analysis is methodologically appropriate for small samples, limited statistical power reduces the likelihood of detecting small or moderate effect sizes. As a result, non-significant findings—particularly those concerning the relationship between AI usage frequency and psychological constructs—should be interpreted cautiously. It remains possible that subtle associations exist but were not identified due to insufficient statistical sensitivity. Furthermore, the sample was drawn from a single academic institution and primarily consisted of university students and working students, which restricts the extent to which the findings can be generalized to broader populations, including older adults, experienced professionals, or individuals in non-academic environments.

Second, the study relied exclusively on self-reported measures of creativity, cognitive dependency, and creative self-confidence. While internal consistency reliability of the scales was acceptable to strong, self-report data are inherently vulnerable to subjective bias. Participants' responses may have been influenced by social desirability tendencies, individual differences in self-awareness, or personal beliefs about AI that shape perception independently of actual cognitive performance. Importantly, perceived reductions in creativity do not necessarily correspond to objective declines in creative ability. Without behavioral tasks, performance-based creativity assessments, or neurocognitive measures, it is not possible to determine whether reported perceptions reflect measurable changes in cognitive functioning.

Third, the cross-sectional research design limits the ability to draw causal conclusions. Data were collected at a single point in time, preventing the examination of temporal dynamics or long-term developmental effects. Although significant correlations were observed between perceived creativity reduction and cognitive dependency, the directionality of these relationships cannot be determined. It remains unclear whether feelings of reduced creativity lead to increased dependency, whether dependency fosters diminished creative self-perception, or whether both are influenced by underlying motivational or contextual variables. Longitudinal or experimental research designs would be required to clarify causal pathways and assess potential long-term cognitive consequences of sustained AI use.

Taken together, these limitations highlight the exploratory nature of the present study and underscore the need for larger, multi-method, and longitudinal investigations to more comprehensively assess the psychological and cognitive implications of generative AI integration.

Future research should incorporate longitudinal designs and experimental manipulation of AI use intensity. Combining survey-based approaches with neurocognitive methods, such as EEG or behavioral recall tasks, may provide deeper insight into how AI engagement influences learning, memory, and creative development over time.

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6. Discussion

6.1 Sample Size and Statistical Power

A primary limitation of the present study concerns the relatively small sample size (N = 39). Although Pearson correlation analysis remains statistically appropriate for small samples, limited statistical power reduces the probability of detecting small to moderate effect sizes. In correlational research, insufficient power increases the risk of Type II errors, meaning that existing relationships may remain undetected.

This limitation is particularly relevant given that the primary hypotheses (H1–H3) examining associations between AI usage frequency and psychological constructs were not statistically supported. While the absence of significant correlations may reflect genuine lack of association, it is equally plausible that subtle relationships were present but could not be detected within the available sample size. In emerging research areas—especially those involving complex psychological constructs—effect sizes are often moderate rather than large. Therefore, replication with larger samples is necessary before strong conclusions can be drawn regarding null findings.

Furthermore, a small sample restricts the stability of correlation coefficients and may increase susceptibility to sampling variance. The modest sample size also constrains generalizability, as findings cannot be confidently extended beyond the specific academic context examined in this study.

Nevertheless, as an exploratory investigation, the study provides preliminary empirical insights that can inform larger-scale research.

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6.2 Cross-Sectional Research Design

The study employed a cross-sectional design, collecting data at a single point in time. While this approach allows identification of statistical associations, it precludes conclusions regarding causality or temporal directionality.

For instance, significant correlations were observed between perceived creativity reduction and cognitive dependency. However, the direction of this relationship remains theoretically ambiguous. It is possible that individuals who perceive a reduction in their independent creativity develop stronger reliance on AI tools. Conversely, sustained dependency on AI may gradually alter self-perceptions of creative autonomy. A third possibility is that both variables are influenced by underlying factors such as academic stress, motivational orientation, or technological self-efficacy.

Cross-sectional correlational data cannot disentangle these competing explanations. Longitudinal designs would be necessary to determine whether dependency strengthens over time as AI use increases, or whether initial psychological predispositions predict subsequent reliance. Experimental designs manipulating AI access could further clarify causal mechanisms. Thus, while the present study identifies meaningful relational patterns, it does not establish developmental trajectories or causal pathways.

6.3 Reliance on Self-Report Measures

All primary variables were measured using self-report instruments. Although internal consistency reliability across scales was acceptable to strong (Cronbach's $\alpha \geq .70$), self-report data introduce several potential sources of bias.

First, responses may be influenced by social desirability effects, particularly given ongoing public discourse surrounding AI dependency and academic integrity. Participants may

underreport reliance behaviors or overreport independent thinking due to perceived normative expectations.

Second, self-perceived creativity reduction does not necessarily correspond to objective creative performance. Subjective beliefs about diminished independent thinking may reflect shifts in authorship attribution rather than measurable declines in cognitive capacity. Without behavioral creativity tasks, problem-solving assessments, or performance-based indicators, it remains unclear whether reported perceptions reflect actual cognitive changes.

Third, individual differences in metacognitive awareness may influence scale responses. Some participants may possess higher sensitivity to subtle changes in their cognitive habits, while others may lack awareness of dependency patterns.

The absence of objective cognitive or behavioral measures limits construct validation and restricts the ability to triangulate subjective perceptions with measurable performance outcomes. Future research integrating experimental tasks, creativity assessments, or neurocognitive indicators would strengthen interpretative confidence

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6.4 Operationalization of AI Usage Frequency

AI usage frequency was measured using a single-item Likert-type scale. While appropriate for exploratory correlational analysis and easy participant comprehension, this operationalization captures only quantitative frequency rather than qualitative patterns of use.

Frequency of interaction does not distinguish between augmentation-oriented usage (e.g., brainstorming, idea expansion, refinement support) and substitution-oriented usage (e.g., direct copying, task delegation, minimal personal engagement). These different usage styles may have distinct cognitive and psychological implications.

Moreover, frequency does not measure depth of reliance, emotional attachment, or perceived indispensability—factors conceptually central to cognitive dependency. A participant using AI daily for minor clarification tasks may exhibit less dependency than a participant using AI weekly but relying on it to complete core academic assignments.

Thus, the single-item measure may oversimplify the multidimensional nature of AI engagement. Future studies should incorporate multi-item frequency scales, contextual task differentiation, and measures of qualitative reliance patterns to better capture the complexity of AI interaction.

6.5 Sample Characteristics and Generalizability

The sample primarily consisted of young adults enrolled in academic programs or employed as working students in Ulm, Germany. While this demographic is highly relevant due to frequent interaction with digital technologies, the homogeneity of the sample restricts external validity.

Age-related cognitive development, professional expertise, and occupational context may influence both AI usage patterns and psychological interpretations of dependency. For example, experienced professionals may use AI as efficiency enhancement tools without experiencing diminished creative confidence. Conversely, individuals in high-stakes professions may exhibit stronger automation bias or performance reliance.

Cultural factors may also shape attitudes toward technology and autonomy. Since all participants were affiliated with a single university environment, contextual influences such as institutional norms, peer behavior, and academic expectations may have shaped responses.

Therefore, the findings cannot be generalized to broader populations without caution. Replication across diverse cultural, professional, and age groups would strengthen generalizability.

6.6 Absence of Objective Cognitive Measures

The study focused on subjective perceptions of creativity reduction and dependency rather than objective indicators of cognitive performance. No behavioral creativity tasks, working memory assessments, executive function tests, or neurophysiological measures were included.

Given emerging experimental evidence suggesting reduced neural connectivity and altered cognitive engagement during AI-assisted tasks (e.g., EEG and fNIRS studies), incorporating objective measures would allow stronger triangulation between perceived and actual cognitive effects.

Without such measures, it remains possible that perceived creativity reduction reflects attributional shifts rather than functional cognitive decline. Integrating experimental tasks, delayed recall assessments, or performance-based creativity metrics would enhance construct validity and theoretical precision.

6.7. Concluding Note on Limitations

As AI-related psychological research remains in an early stage of development, standardized and widely validated scales for measuring AI-specific cognitive dependency are still emerging. While the present study employed internally reliable multi-item scales, the constructs themselves reflect evolving conceptual boundaries.

Future research should continue refining measurement instruments, distinguishing between adaptive technological integration and maladaptive dependency. Greater conceptual clarity will improve comparability across studies and strengthen theoretical integration.

6.8 Summary of Key Findings

The present study set out to examine whether frequency of AI usage predicts perceived reductions in creativity, heightened cognitive dependency, and diminished creative self-confidence among digitally active young adults. Contrary to the initial hypotheses, AI usage frequency was not significantly associated with any of the primary outcome variables. This suggests that mere exposure or frequency of interaction with AI systems does not, in itself, account for variations in perceived cognitive or creative impact.

However, the findings revealed a robust and statistically significant positive relationship between perceived creativity reduction and cognitive dependency ($r = .672$, $p < .001$), alongside a moderate association between creativity reduction and diminished creative confidence ($r = .363$, $p = .023$). These results indicate that subjective experiences of reduced independent thinking are closely intertwined with psychological reliance on AI systems and attenuated self-efficacy.

The data therefore suggest that the psychological architecture surrounding AI use—rather than behavioral frequency alone—constitutes the more critical explanatory mechanism. Dependency appears to be embedded within users' subjective interpretations of their own cognitive agency, pointing toward a qualitatively mediated rather than quantitatively driven phenomenon.

6.9 Discussion of Findings

The absence of significant associations between AI usage frequency and the examined psychological constructs complicates prevailing narratives that equate increased technological engagement with inevitable cognitive decline. Instead, the findings support a more differentiated model: the cognitive consequences of AI use appear contingent not upon exposure per se, but upon the degree to which AI becomes integrated into the individual's internal cognitive schema as a substitute rather than an augmentative instrument.

The strong association between perceived creativity reduction and cognitive dependency may be interpreted through the lens of Cognitive Offloading Theory. Offloading cognitive processes to external systems reduces immediate mental effort and enhances efficiency; however, repeated substitution of internal generative processes may attenuate opportunities for deep semantic integration and autonomous problem structuring. Empirical neurocognitive research provides convergent support for this interpretation. Longitudinal EEG evidence demonstrates systematically reduced neural connectivity during AI-assisted writing tasks, alongside diminished memory recall and lower perceived authorship of produced content . Such findings suggest that reliance on generative AI may not simply redistribute cognitive effort, but may reconfigure patterns of neural engagement associated with executive control and memory encoding.

From the standpoint of Self-Determination Theory, these results may reflect subtle disruptions in the satisfaction of autonomy and competence needs. When AI systems assume primary responsibility for ideational structuring, individuals may experience a shift in perceived locus of causality from internal to external sources. Although output quality and fluency may increase, the subjective experience of authorship may weaken. In this sense, creative production may become operationally efficient while psychologically externalized.
This dynamic can be conceptualized as a structural tension between perceived competence and authentic competence. AI systems may inflate perceived creative capacity through polished outputs, yet simultaneously undermine the internal processes that cultivate durable creative expertise. The observed correlation between creativity reduction and dependency may therefore represent not simply attitudinal alignment, but an emerging cognitive pattern in which externalized ideation gradually becomes normalized.

The findings further resonate with the I-PACE framework, which conceptualizes technology-related dependency as arising from the interaction of personal vulnerabilities, affective states, and cognitive expectations. While AI usage frequency did not predict dependency in this sample, it is plausible that motivational variables—such as academic stress, performance anxiety, or low self-efficacy—mediate the pathway toward reliance. Thus, dependency may represent an adaptive coping strategy that gradually transforms into structural reliance.

Importantly, these findings contribute to reconciling the apparent contradiction within the broader literature. Augmentation studies demonstrate improvements in short-term output quality, while cognitive risk studies emphasize diminished engagement and deep processing. The present data suggest that these positions are not mutually exclusive. AI may enhance product-level creativity while simultaneously altering process-level creativity. In Boden's framework, exploratory creativity may be facilitated through rapid combinational generation, whereas transformational creativity—requiring conceptual restructuring—may be less frequently exercised when ideation is externally scaffolded.

Thus, the critical issue may not be whether AI enhances or diminishes creativity, but rather how it redefines the locus of creative agency.

Large-scale meta-analytic evidence further indicates that the creative effects of GenAI are moderated by user expertise. Laypeople tend to benefit more strongly from human–AI collaboration, whereas domain experts show weaker or non-significant gains (Holzner, Maier, & Feuerriegel, 2025). Given that the present sample consisted primarily of university students and working students rather than highly specialized experts, the absence of significant negative effects of AI usage frequency may reflect a context in which AI is perceived as supportive rather than threatening to creative competence .

6.10 Recommendations

Given these findings, institutional responses to generative AI should move beyond simplistic prohibitive or permissive approaches. Instead, a structured integration model is warranted—one that distinguishes between augmentation and substitution.

Educational practices should be designed to preserve cognitive friction where pedagogically beneficial. Structured reflection exercises, mandatory pre-AI drafting phases, and critical evaluation tasks can help ensure that AI serves as a collaborative scaffold rather than a cognitive surrogate. Explicit instruction in AI literacy should incorporate metacognitive components, educating users about automation bias, cognitive offloading, and the importance of maintaining internal generative capacity.

In professional contexts, organizations may benefit from implementing differentiated AI usage protocols. Tasks requiring divergent ideation or conceptual reframing may warrant limited AI assistance to preserve autonomous cognitive engagement. Conversely, routine structuring or summarization tasks may appropriately leverage AI efficiency without substantial risk to creative development.
Ultimately, sustainable AI integration requires preserving the developmental functions of cognitive effort while harnessing technological affordances.

6.11 Suggestions for Future Research

Future research should prioritize longitudinal designs capable of disentangling causal directionality between perceived creativity reduction and cognitive dependency. It remains unclear whether dependency erodes perceived creativity, whether diminished creative self-efficacy drives reliance, or whether both emerge from broader motivational dynamics. Experimental paradigms comparing substitutional versus augmentative AI usage styles would provide valuable insight into process-level effects. Furthermore, integrating behavioral creativity assessments and delayed memory recall tasks would enable triangulation of subjective perception with objective cognitive performance.

Advanced statistical modeling, including structural equation modeling, could test mediated pathways linking AI literacy, stress, dependency, and creative confidence within the I-PACE framework. Additionally, future work should differentiate among creativity types—combinational, exploratory, and transformational—to determine whether AI disproportionately influences certain cognitive modes.

Finally, interdisciplinary research combining psychological measurement with neurophysiological methods may clarify whether subjective experiences of reduced agency correspond to measurable changes in neural engagement over time.

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7. Conclusion

The rapid integration of generative artificial intelligence into academic and professional environments has generated intense debate regarding its cognitive and creative implications. While some scholars emphasize augmentation and productivity gains, others raise concerns about dependency, cognitive offloading, and diminished deep processing. The present study sought to contribute empirical clarity to this discussion by examining whether AI usage frequency is associated with perceived reductions in creativity, increased cognitive dependency, and diminished creative self-confidence among young adults.

Contrary to deterministic assumptions, the findings demonstrate that AI usage frequency alone does not significantly predict perceived creativity reduction, dependency, or confidence. This suggests that the mere frequency of engagement with AI systems is insufficient to explain psychological outcomes. Rather than quantity of use, the qualitative psychological integration of AI into cognitive processes appears more consequential.

The most salient finding of this study was the strong positive association between perceived creativity reduction and cognitive dependency. Individuals who reported diminished independent thinking also reported higher psychological reliance on AI systems. Furthermore, perceived creativity reduction was moderately associated with lower creative confidence. These results suggest that dependency is not simply behavioral but perceptual and cognitive in nature. The data indicate that when individuals experience a reduction in autonomous ideation, AI may transition from a supportive tool to a perceived cognitive necessity.

Interpreted through Cognitive Offloading Theory, the findings suggest that while delegating cognitive processes to AI can reduce mental effort and increase efficiency, repeated substitution

of internal generative processes may reshape perceptions of agency and ownership. From a Self-Determination Theory perspective, such reliance may reflect subtle shifts in autonomy and competence satisfaction, as the locus of creative causality moves from internal cognitive effort toward externally generated outputs. The study thus contributes to an emerging understanding of AI not merely as a productivity enhancer, but as a potential structural modifier of cognitive engagement patterns.

Importantly, these findings help reconcile conflicting strands of the literature. Augmentation research demonstrates improvements in output quality and fluency, while cognitive risk research highlights reduced engagement and potential skill erosion. The present results suggest that these perspectives operate at different analytical levels. AI may enhance product-level creativity while simultaneously altering process-level creativity and subjective creative agency. In this sense, generative AI does not necessarily diminish creativity directly; rather, it may redefine how creativity is experienced, attributed, and sustained.

The implications of this shift are particularly relevant for young adults in formative academic and early-career stages, where cognitive habits and creative identities are still developing. If perceived competence becomes externally anchored in AI-assisted performance, long-term implications for independent problem-solving and transformational creativity warrant careful consideration.

In conclusion, the present study underscores the importance of moving beyond simplistic narratives of technological harm or benefit. Generative AI represents neither an inherent cognitive threat nor an unequivocal creative amplifier. Its impact depends on patterns of psychological integration, motivational orientation, and usage style. Future research must therefore continue to investigate not only how often AI is used, but how it becomes embedded within the cognitive architecture of its users.

Understanding this distinction is essential as societies increasingly navigate the balance between technological augmentation and the preservation of human cognitive autonomy.

7.1 Evaluation of Research Objectives

The primary objective of this study was to examine whether AI usage frequency is associated with perceived reductions in independent thinking and creativity, increased cognitive dependency, and diminished creative self-confidence among young adults aged 20–35. In line with this aim, three hypotheses were formulated to test whether higher frequency of AI use would predict negative psychological and cognitive outcomes.

The empirical results indicate that AI usage frequency was not significantly associated with perceived creativity reduction, cognitive dependency, or creative self-confidence. Consequently, the specific hypotheses (H1–H3) were not supported. However, the absence of significant correlations between frequency and the examined psychological constructs does not imply that AI use is psychologically neutral. Rather, the findings suggest that frequency alone may be an insufficient explanatory variable for understanding AI-related cognitive perceptions. Importantly, the study revealed a strong and statistically significant relationship between perceived creativity reduction and cognitive dependency, as well as a moderate association between creativity reduction and creative confidence. These findings indicate that subjective experiences of diminished independent thinking are closely intertwined with feelings of psychological reliance on AI systems. Thus, while the original expectation that frequency would predict outcomes was not empirically confirmed, the broader research objective—to explore the relationship between AI engagement and perceived cognitive-creative processes—was achieved.

The study therefore fulfills its core objective by demonstrating that the psychological architecture of AI use appears more complex than initially hypothesized. Rather than simple exposure effects, the findings point toward mediated and perception-based mechanisms that shape the relationship between AI use and creative self-concept.

7.2 Theoretical Contribution of the Study

This study contributes theoretically to the emerging discourse on generative AI and human cognition in several important ways.

First, the findings challenge deterministic narratives that equate frequent AI usage with inevitable cognitive decline or diminished creativity. While much of the public and academic debate frames AI as either a creative catalyst or a cognitive crutch, the present results suggest that this binary framing may be overly simplistic. AI usage frequency alone was not predictive of perceived negative outcomes. Instead, dependency and perceived creativity reduction appear to be embedded within users' subjective interpretations of their cognitive agency.
Second, this study advances the application of Cognitive Offloading Theory within the context of generative AI. Prior research has demonstrated that delegating cognitive processes to external systems can reduce mental effort and working memory demands. The present findings extend this framework by suggesting that cognitive offloading in AI-assisted contexts may influence perceptions of creative autonomy even when frequency of use remains constant. Thus, the psychological consequences of AI engagement may depend more on the degree of substitution versus augmentation than on quantitative exposure.

Third, the integration of Self-Determination Theory provides a motivational lens through which AI-related dependency can be understood. From an SDT perspective, autonomy and competence represent fundamental psychological needs underlying intrinsic motivation. When creative ideation becomes externally scaffolded by AI systems, individuals may experience subtle shifts in perceived locus of causality. Even if output quality improves, the internal experience of authorship and self-originated competence may be altered. The strong association between creativity reduction and dependency observed in this study is theoretically consistent with such autonomy-related dynamics.

Fourth, by drawing conceptually on the I-PACE model, the study situates AI dependency within a broader psychological framework of person–affect–cognition interactions. The findings suggest that dependency may not emerge solely from behavioral frequency, but from psychological mechanisms involving perceived performance expectations, stress regulation,

and self-efficacy. This reframing positions AI dependency not merely as technological overuse, but as a mediated psychological process.

Finally, the study contributes methodologically by examining creativity reduction, dependency, confidence, and positive attitudes toward AI within a single integrated correlational design. Much of the existing literature isolates individual constructs or relies on short-term experimental tasks. By examining naturalistic AI usage patterns among young adults, this research adds ecological validity to the debate and highlights the distinction between laboratory-based performance enhancement and everyday cognitive perception.

In sum, the theoretical contribution of this study lies in its reconceptualization of AI-related cognitive impact as a qualitatively mediated phenomenon. The results suggest that the central issue is not how often AI is used, but how it is psychologically integrated into the user's sense of creative agency.

The findings encourage a reframing of the "AI as catalyst versus AI as crutch" debate. Rather than positioning AI as inherently beneficial or detrimental, the evidence suggests that AI functions as a structurally neutral system whose impact depends on the cognitive stance adopted by the user. When AI is employed as an augmentative scaffold that stimulates ideation while preserving internal generative effort, creative autonomy may remain intact. However, when AI becomes a substitute for ideational initiation, dependency dynamics may emerge.
This nuanced perspective contributes to a more theoretically grounded and empirically cautious understanding of AI's role in shaping human creativity.

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10. APPENDIX

Appendix A – Full Survey Questionnaire

Section 1: Introduction

This short anonymous survey is part of my Master's Thesis at Hochschule Neu-Ulm (Germany). I'm exploring how Artificial Intelligence (AI) may be affecting creativity and thinking habits among young adults.

It only takes **5–7 minutes**, and there are **no right or wrong answers** — I'm simply interested in your honest experience.

Your responses are **completely anonymous and confidential**.

Thank you so much for taking the time to participate!

Section 1: Types of AI Use

(Choose all that apply)

Which AI tools do you currently use?

☐ AI Chatbots (ChatGPT, Gemini, Claude, etc.)

☐ AI Image Generators (Midjourney, DALL·E, Stable Diffusion)

☐ AI Video Generators (Runway, Sora, Pika Labs)

☐ AI Writing Tools (Grammarly, QuillBot, Notion AI)

☐ AI Photo/Video Editing Tools (filters, enhancement apps, background removal)

☐ AI Coding Assistants (GitHub Copilot, Replit AI)

☐ AI Productivity Tools (Microsoft Copilot, automation tools)

☐ AI Music/Audio Generators (Suno, voice cloning)

☐ AI Recommender Systems (TikTok, Instagram, YouTube algorithms)

☐ Other: _____

Section 2: Purpose of AI Use

A. What do you use AI tools for? (Please select all relevant reasons.)

(Choose all that apply)

☐ ***Writing / Text creation***

(e.g., emails, summaries, essays, reports, messages, rewriting text)

☐ ***Idea generation***

(e.g., brainstorming topics, finding inspiration, generating alternatives)

☐ ***Creative projects***

(e.g., art, design, photo/video editing, content creation, scripts, captions)

☐ ***Studying / Learning support***

(e.g., explanations, tutoring, understanding concepts, practice questions)

☐ ***Planning & daily tasks***

(e.g., schedules, travel planning, meal ideas, routines, decision support)

☐ ***Social media content***

(e.g., captions, ideas, editing, improving posts, scriptwriting)

☐ ***Entertainment***

(e.g., chatting for fun, games, storytelling, exploring creative prompts)

☐ ***Other:*** _____

b) Why do you use AI tools?

☐ ***To save time***

(e.g., completing tasks faster than doing them manually)

☐ ***To reduce mental effort*** *(e.g., avoiding long research or complex thinking)*

☐ ***To avoid overthinking or getting stuck*** *(e.g., using AI to start tasks or break creative blocks)*

☐ ***Curiosity / experimentation*** *(e.g., testing new tools, exploring features, learning new AI skills)*

☐ ***Other:*** _____

Section 4: Creativity Before AI

(Scale: 1 = Strongly Disagree → 5 = Strongly Agree)

- Before using AI, I relied more on my own thinking and ideas.
- I searched for inspiration independently (books, internet, conversations).
- I spent more time researching and thinking deeply before starting tasks.
- I completed creative tasks more independently.
- I felt more engaged in the creative process before using AI.

Section 5: Current AI Use & Habits

How often do you use AI tools?

☐ Daily

☐ A few times a week

☐ A few times a month

☐ Rarely

☐ Never

Section 6: Effects on Creativity & Original Thinking

(Scale: 1 = Strongly Disagree → 5 = Strongly Agree)

- AI gives me ideas faster than I can think of them myself.
- Since using AI, I spend less time thinking creatively on my own.
- I use AI even for tasks I previously did independently.
- AI sometimes makes me feel less creative.
- I feel my original ideas have decreased since using AI.
- I feel less confident in my ideas when comparing them to AI-generated results.
- AI-generated content often appears more polished than my own ideas.
- I sometimes accept AI's suggestions without exploring my own.

Section 7: Motivation & Mental Effort

(Scale: 1 = Strongly Disagree → 5 = Strongly Agree)

- AI makes me postpone tasks because I know I can complete them quickly with assistance.
- I find it harder to start tasks without using AI.
- I use AI because it reduces the mental effort required.
- I feel less motivated to brainstorm independently.
- I sometimes feel dependent on AI tools to begin or complete tasks.

Section 8: Confidence & Comparison With Others

(Scale: 1 = Strongly Disagree → 5 = Strongly Agree)

- I feel less confident working without AI when others use it.
- I worry that others' AI-supported work appears better than mine.
- I feel social pressure to use AI because many people around me use it.
- I feel more confident submitting work after AI has improved it.

Section 9: Potential for Positive Use of AI

(Scale: 1 = Strongly Disagree → 5 = Strongly Agree)

- AI can enhance creativity when used appropriately.
- AI helps me explore more ideas than I could on my own.

- AI can support creativity without replacing it.
- I try to combine AI suggestions with my own thinking.
- Users should have guidelines for maintaining originality when using AI.
- It is possible to remain creative while using AI tools.

Section 10: Basic Information

Age:

☐ 20–24

☐ 25–29

☐ 30–35

☐ Other: _____

Gender:

☐ Female

☐ Male

☐ Other / Prefer not to say

Occupation:

☐ Student (not working)

☐ Student + working student

☐ Employed full-time

☐ Freelancer / self-employed

☐ Job seeker

☐ Unemployed

☐ Other: _____

Field of study/work:

☐ Business / Economics

☐ Media / Communication

☐ Arts / Design / Creative industries

☐ IT / Computer Science

☐ Engineering

☐ Natural Sciences

☐ Social Sciences

☐ Education

☐ Healthcare / Medicine

☐ Law / Public administration

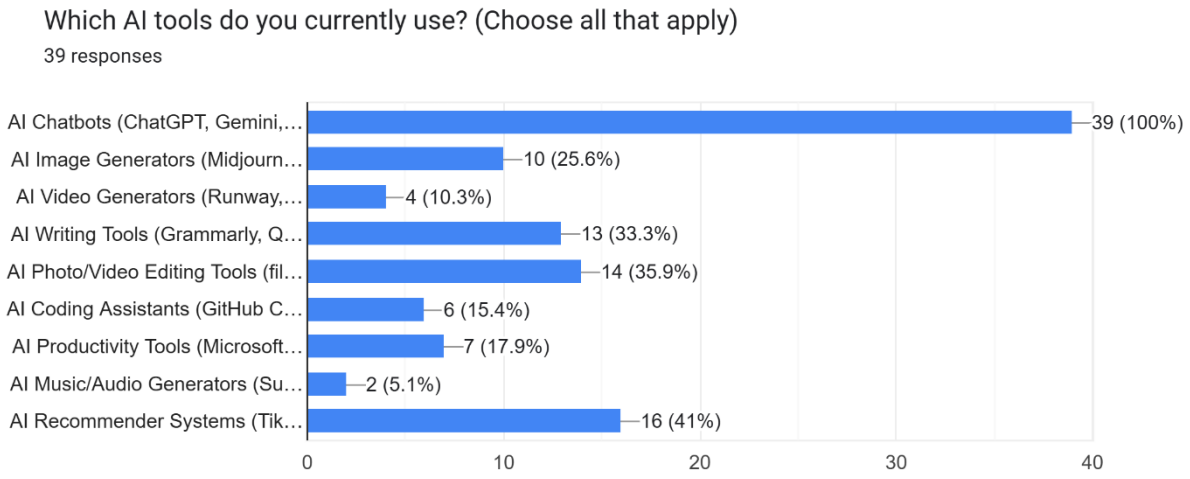
☐ Marketing / Advertising

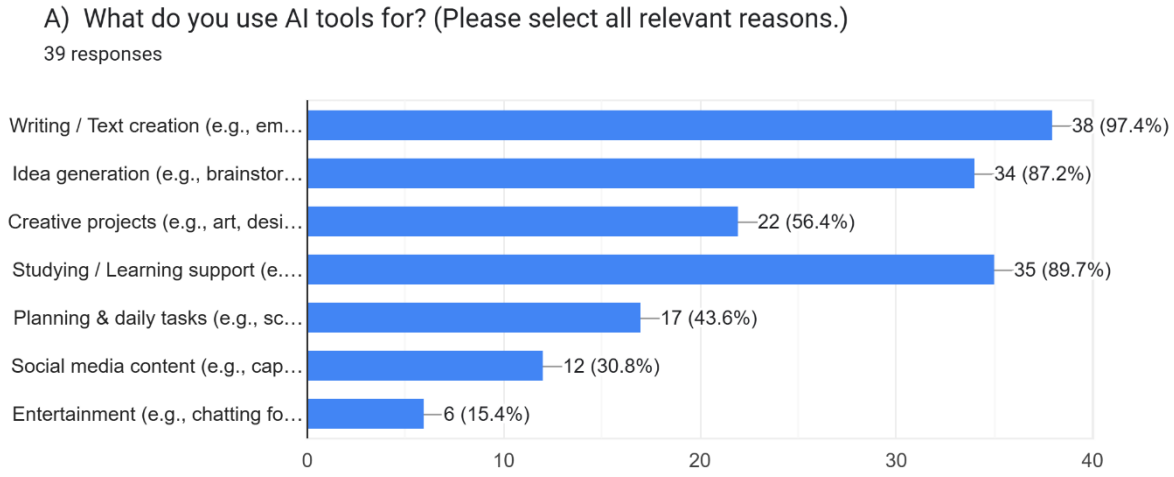
☐ Sales / Customer service

☐ Hospitality / Tourism

☐ Other: _____

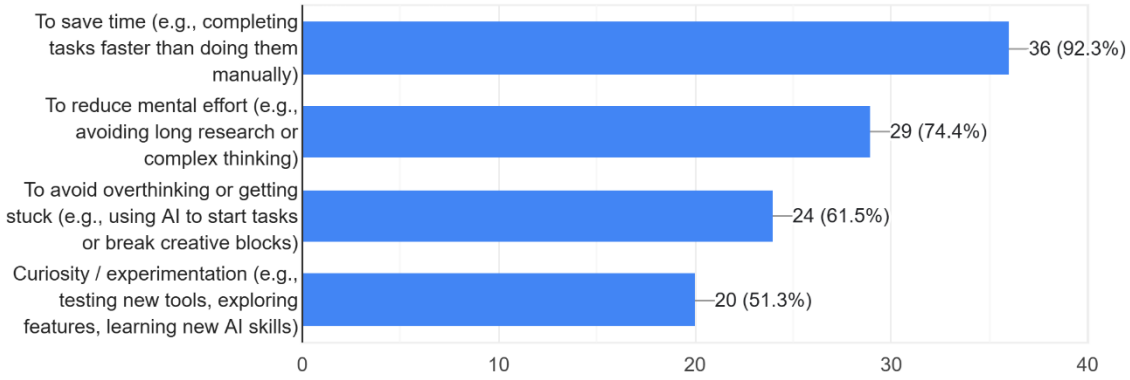
Appendix B: Survey results chartrs





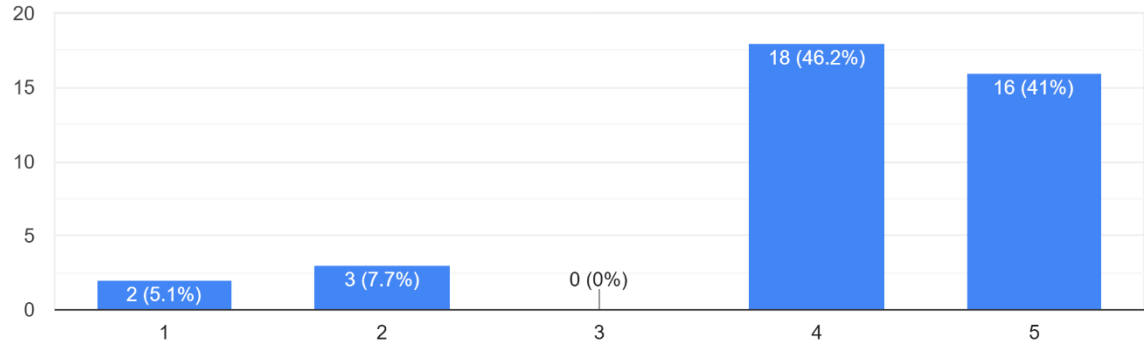
B) Why do you use AI tools?

39 responses



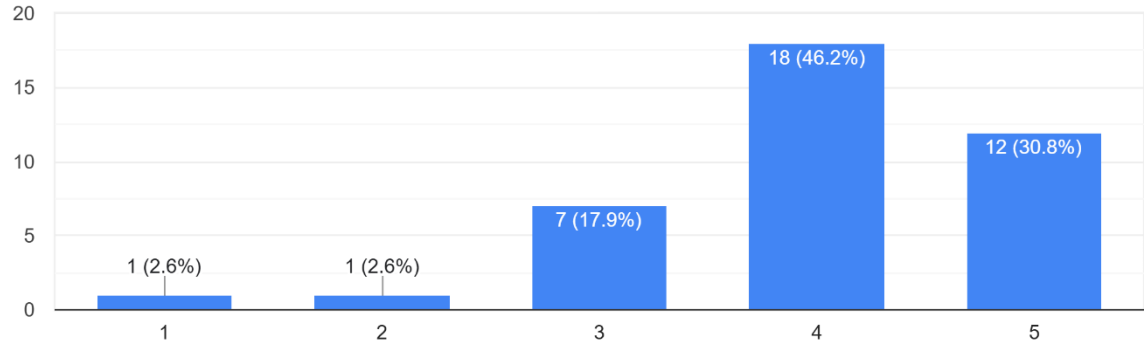
Before using AI, I relied more on my own thinking and ideas.

39 responses



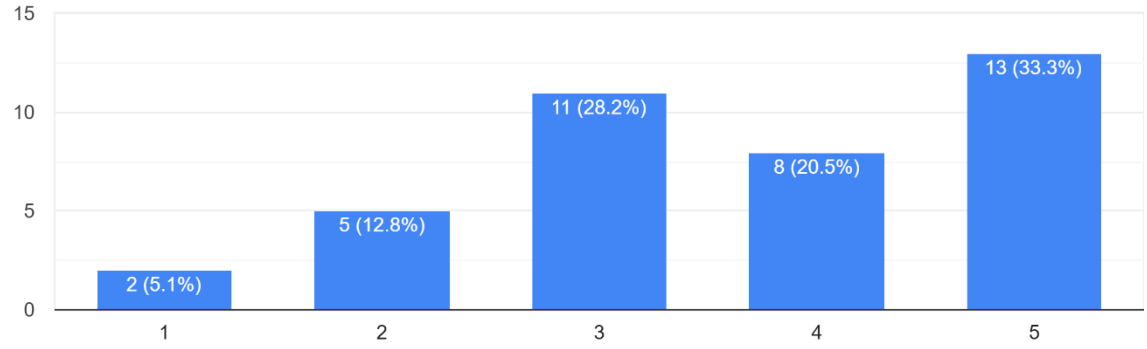
I searched for inspiration independently (books, internet, conversations).

39 responses



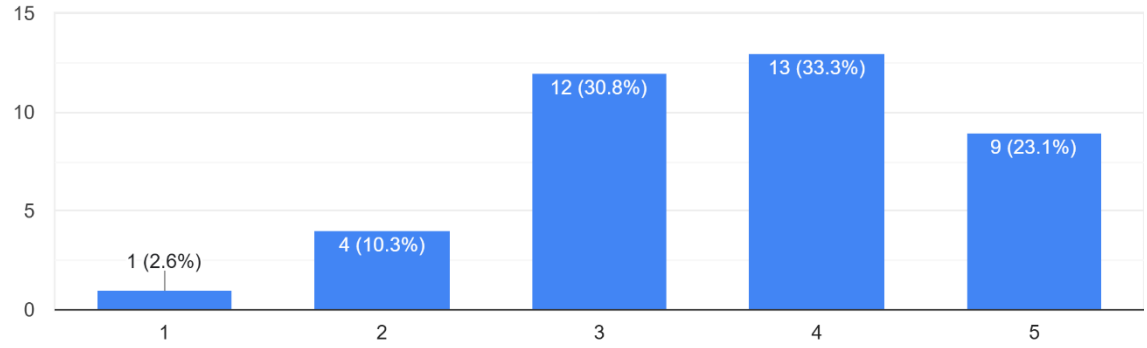
I spent more time researching and thinking deeply before starting tasks.

39 responses



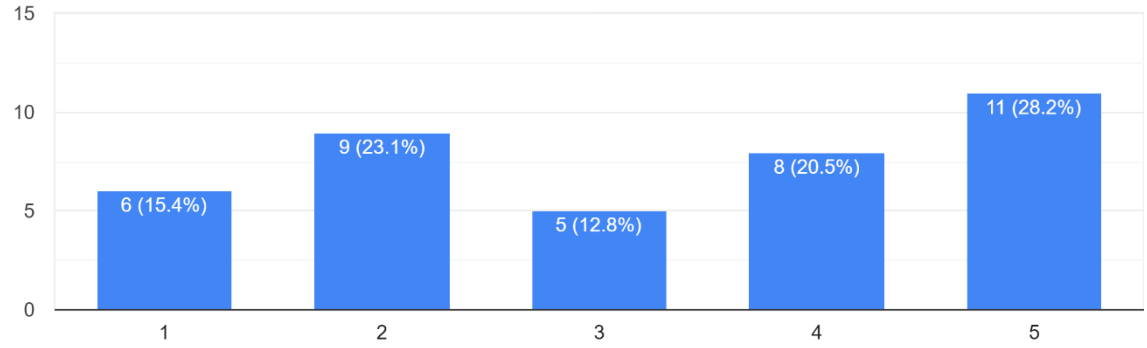
I completed creative tasks more independently.

39 responses



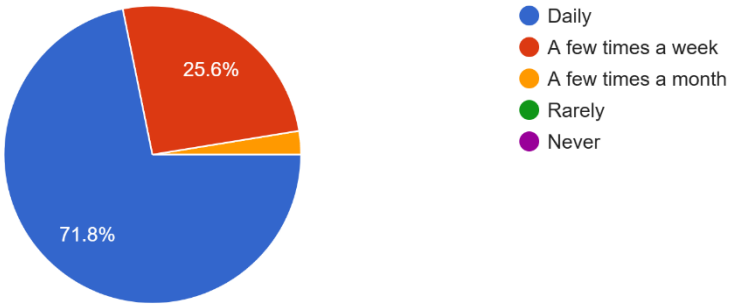
I felt more engaged in the creative process before using AI.

39 responses



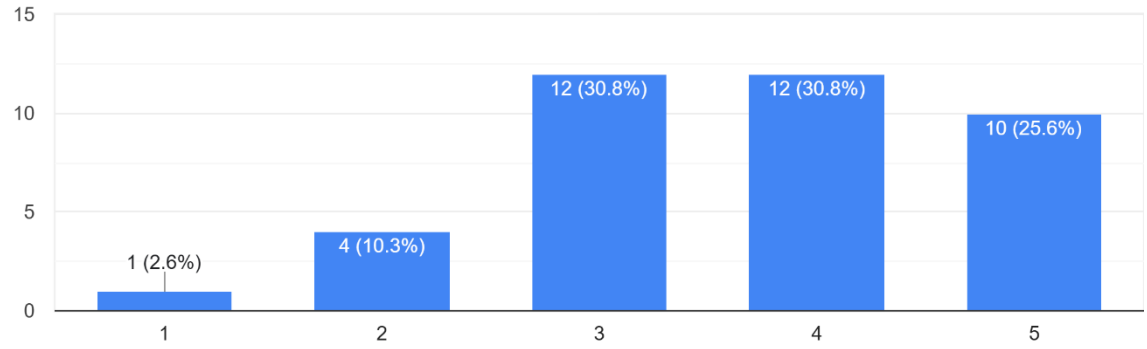
How often do you use AI tools?

39 responses



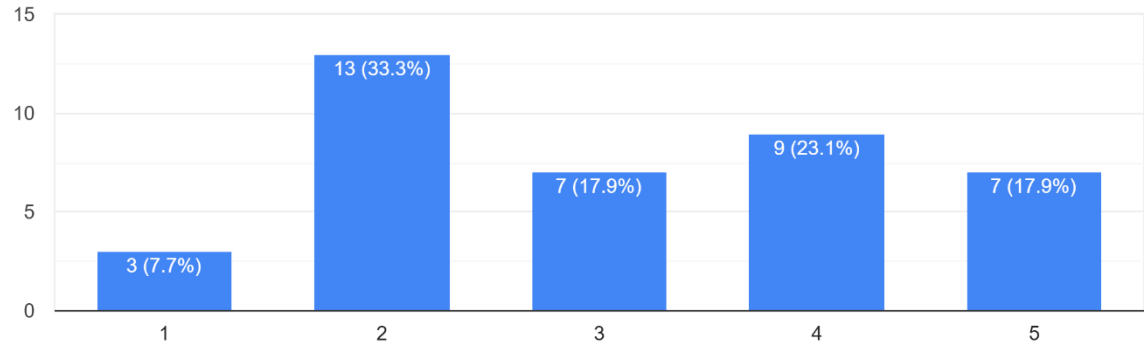
AI gives me ideas faster than I can think of them myself.

39 responses



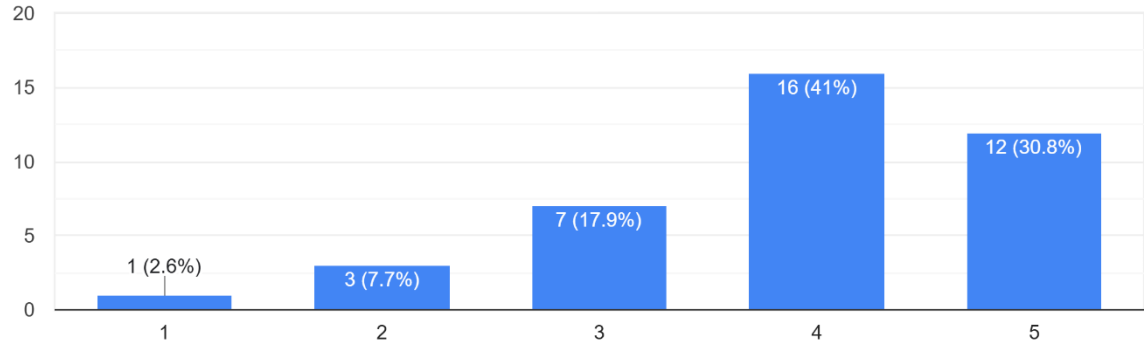
Since using AI, I spend less time thinking creatively on my own.

39 responses



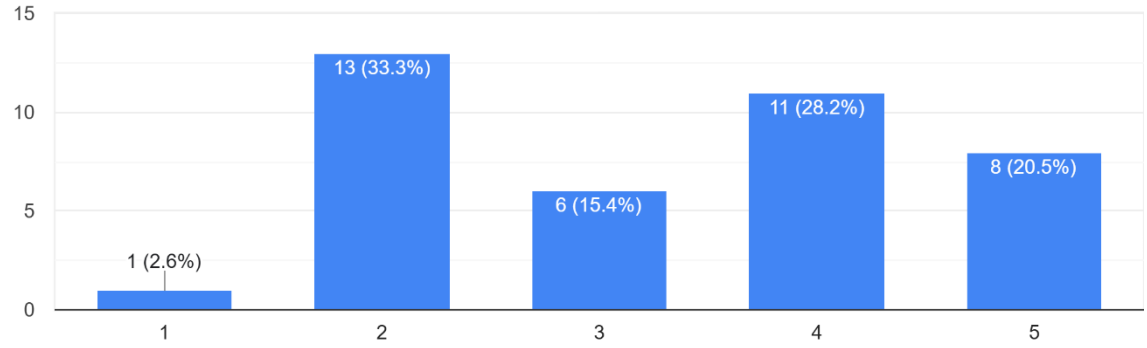
I use AI even for tasks I previously did independently.

39 responses



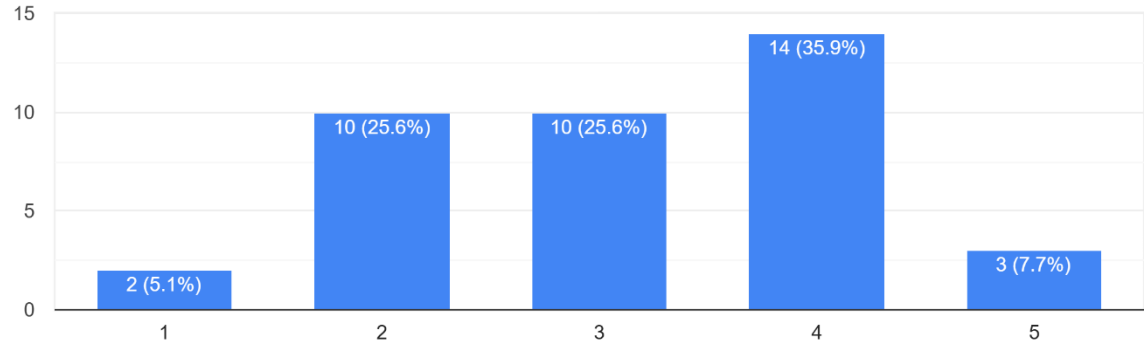
AI sometimes makes me feel less creative.

39 responses



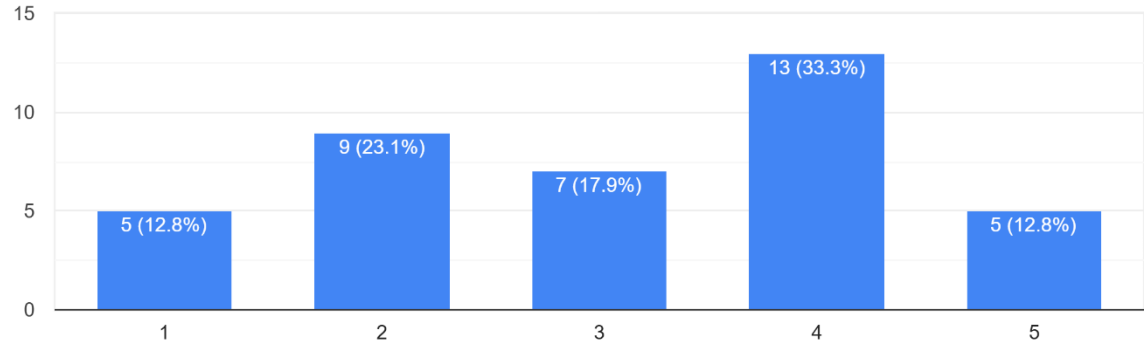
I feel my original ideas have decreased since using AI.

39 responses



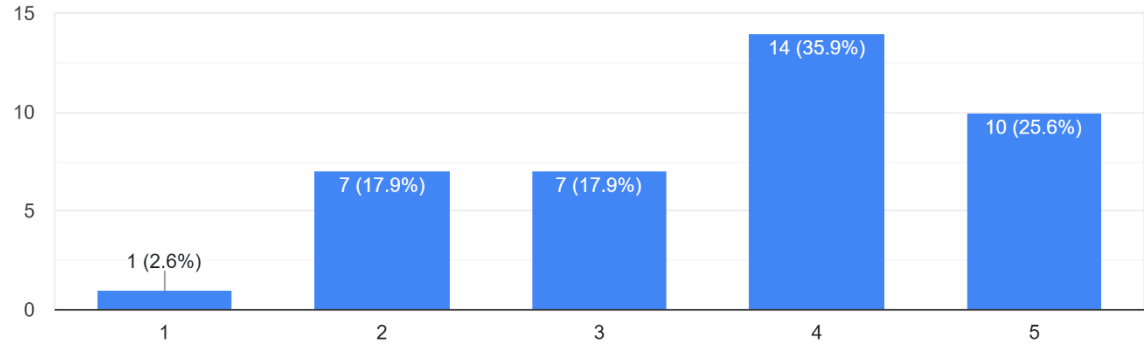
I feel less confident in my ideas when comparing them to AI-generated results.

39 responses



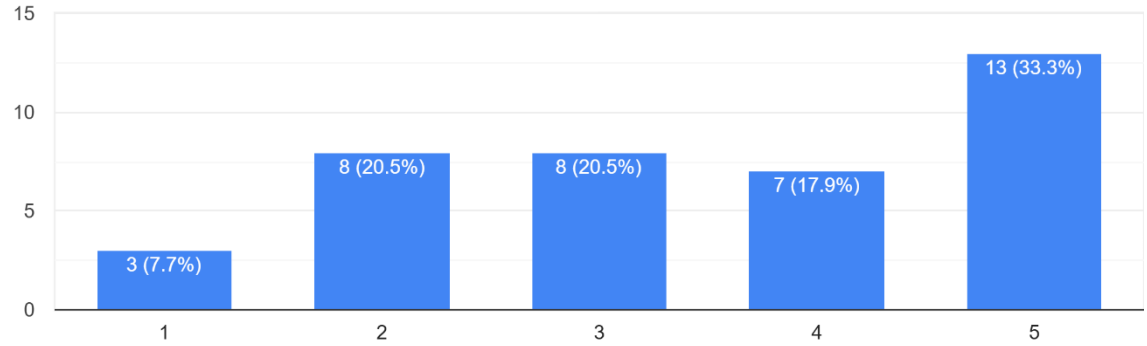
AI-generated content often appears more polished than my own ideas.

39 responses



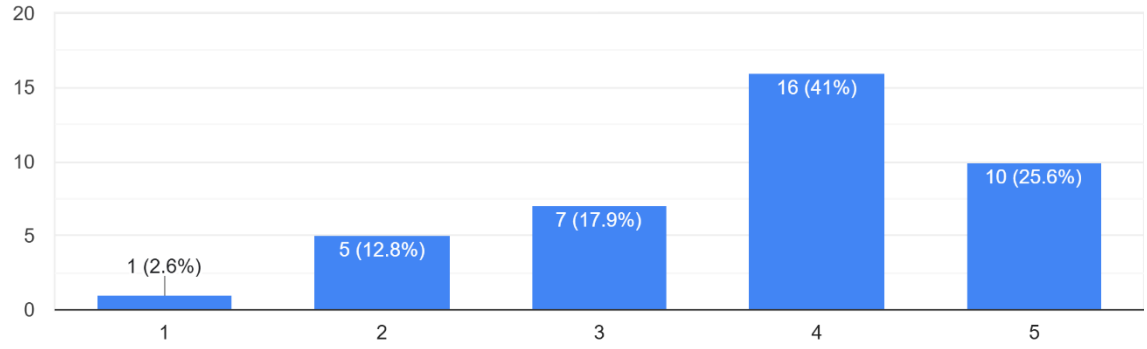
AI makes me postpone tasks because I know I can complete them quickly with assistance.

39 responses



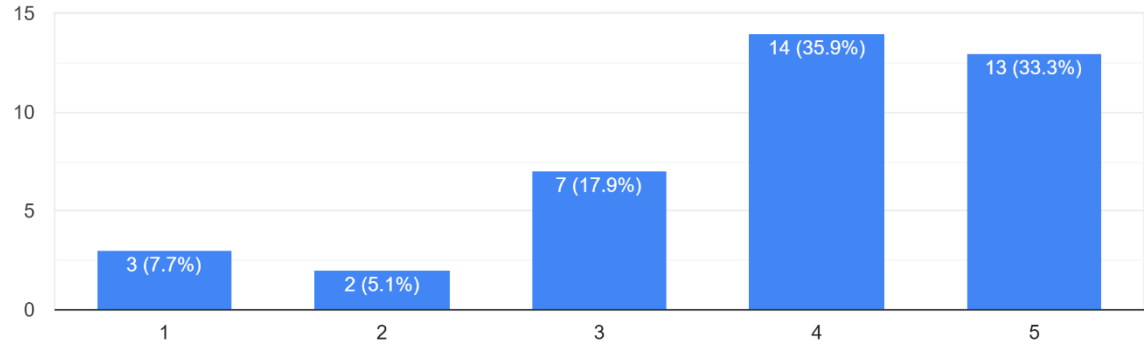
I find it harder to start tasks without using AI.

39 responses



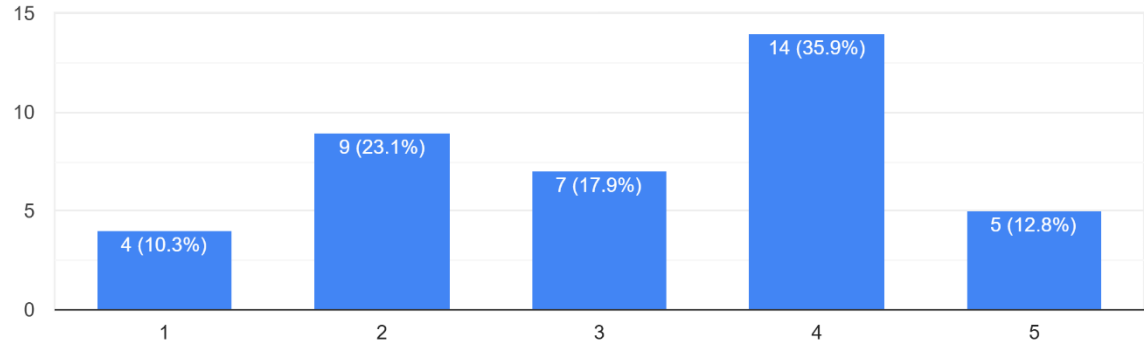
I use AI because it reduces the mental effort required.

39 responses



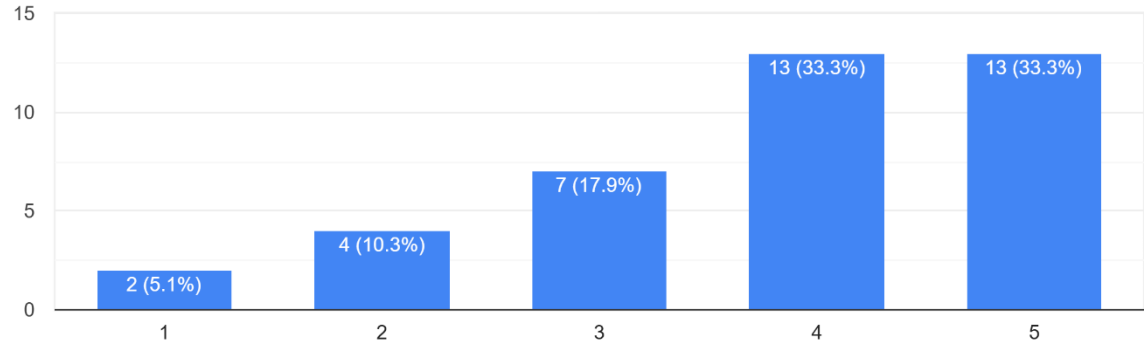
I feel less motivated to brainstorm independently.

39 responses



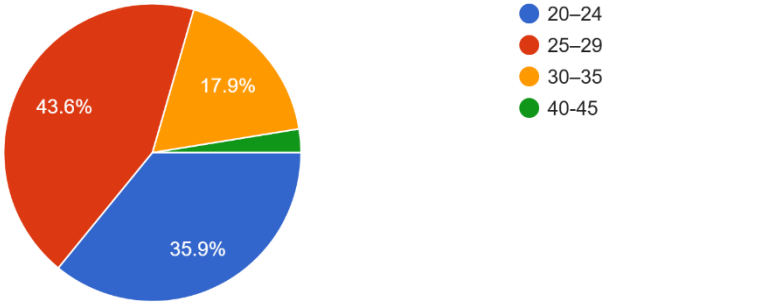
I sometimes feel dependent on AI tools to begin or complete tasks.

39 responses



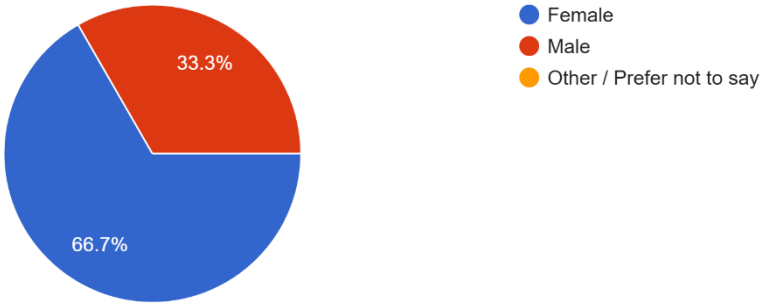
Age:

39 responses



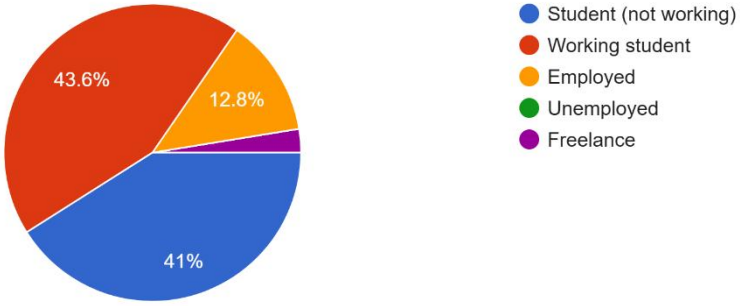
Gender:

39 responses



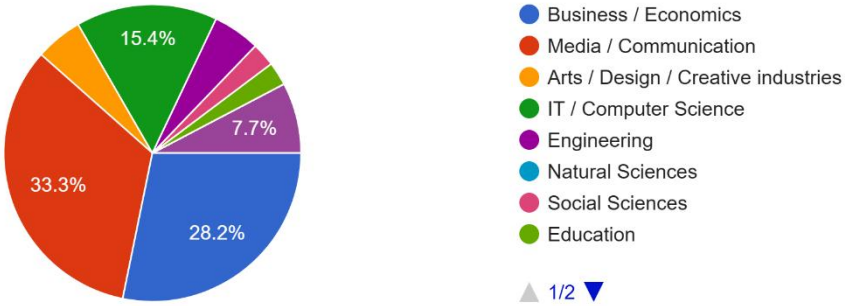
Employment status

39 responses



Field of study/work:

39 responses



Declaration of Academic Integrity

Affidavit for the Master's thesis

I, [Duha Al-Adwan], hereby declare on oath that I have written this thesis independently and only with the help of the works mentioned in the list of sources and references. Every text passage that refers to other people's ideas, either literally or in meaning, is labelled as such.

The thesis has not yet been submitted or published as an examination paper, either in whole or in part.

Place,Date

Neu-ulm 28.02.2026

Signature