Human–AI Collaboration in Creative Problem-Solving

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Background: Creativity requires novelty and usefulness, with teams often outperforming individuals by integrating diverse perspectives, though group dynamics can sometimes hinder innovation. AI accelerates ideation and expands solutions but may limit originality by reinforcing existing patterns, necessitating human oversight. While teams enhance feasibility through knowledge sharing, over-reliance on AI can stifle creativity. This study explored how AI access and team composition affected originality, effectiveness, and implementability, predicting AI might reduce originality but improve practical outcomes, with team dynamics playing a key role.

Approach: In an empty classroom under varying teaming/AI conditions (see photos):
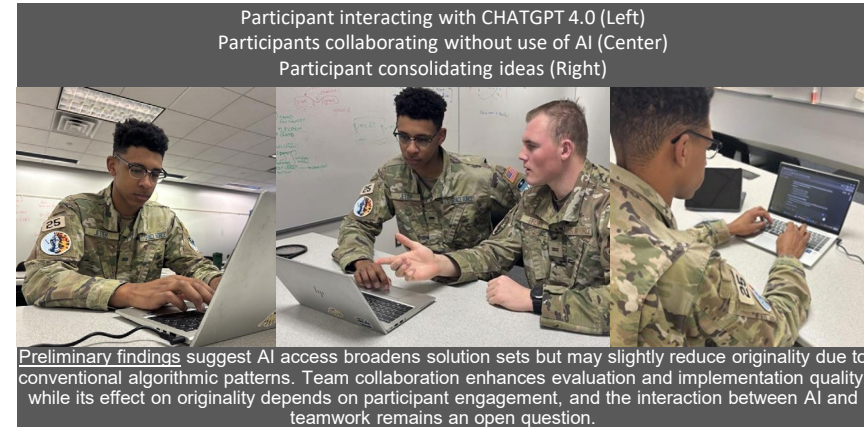1. Participants completed the Military Adapted Alternate Uses Task (MAAUT), generating practical solutions for four military-relevant scenarios.
2. Each participant completed four counterbalanced trials, varying between individual vs. team settings and AI assistant availability.
3. In each trial, participants first generated ideas independently, then refined them alone or with a partner, with or without AI assistance.

Conditions: (1) working individually and the AI assistant was available, (2) working individually and the AI assistant was unavailable, (3) working as part of a dyadic team and the AI assistant was available, and (4) working as part of a dyadic team and the AI assistant was unavailable.
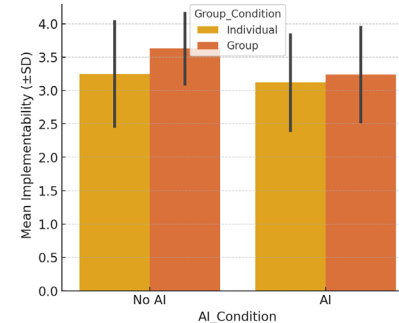
Measures: Final solutions were evaluated on originality, effectiveness, and implementability by two expert coders using a 1-4 scale, with high interrater reliability. Discrepancies in ratings were resolved through discussion to ensure consistency.

Results: The ANOVA results reveal that AI has a significant positive effect on originality ($p < 0.0001$), contradicting the hypothesis that AI would reduce novelty, while individuals outperformed teams in generating original ideas ($p = 0.0058$). AI does not significantly impact effectiveness ($p = 0.29$), though teamwork may provide a slight advantage ($p = 0.05$). However, AI negatively affects implementability ($p = 0.0097$), countering the expectation that it would enhance feasibility, while teamwork improves implementability ($p = 0.011$). No significant interactions were found between AI and team structure across all measures, indicating AI's effects are independent of collaboration. These results suggest that while AI fosters originality, it does not enhance effectiveness and may hinder feasibility, whereas teams contribute to more implementable solutions.

Conclusion: These findings highlight the nuanced impact of AI on creative problem-solving. While AI significantly enhances originality, contrary to expectations, it does not improve effectiveness and even reduces implementability. Teams, on the other hand, contribute to higher feasibility but do not boost originality as much as individuals. The lack of significant interactions suggests that AI's influence is independent of team structure. Overall, these results indicate that while AI can generate more novel ideas, its practical application may be limited without additional refinement, and teamwork remains a key factor in developing feasible solutions.

Participant interacting with CHATGPT 4.0 (Left)
Participants collaborating without use of AI (Center)
Participant consolidating ideas (Right)

Preliminary findings suggest AI access broadens solution sets but may slightly reduce originality due to conventional algorithmic patterns. Team collaboration enhances evaluation and implementation quality, while its effect on originality depends on participant engagement, and the interaction between AI and teamwork remains an open question.

Implementability by AI & Group Condition

Originality by AI & Group Condition