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# Generative AI as an Instructional Design Tool: Visualizing Management Information Systems Concepts Through Microsoft Copilot Infographics

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**Abstract:** Management Information Systems courses introduce interconnected technical and organizational concepts that can be difficult to communicate through text-heavy materials alone. This descriptive teaching case documents a semester-long visual learning ecosystem created with Microsoft Copilot for an undergraduate MIS course. The ecosystem included 20 chapter billboards, 20 post-quiz answer infographics, approximately 50 focused concept posters, and more than 200 company-selection infographics. Chapter reading and quizzes accounted for 50% of the course grade. After each quiz, an instructor-reviewed answer infographic was released. Copilot-generated quiz infographics contained between zero and three incorrect answers, requiring item-level verification. When errors were present, students used discussion boards to identify and discuss incorrect AI responses. The remaining 50% of the course grade consisted of a company-analysis term paper supported by more than 200 company infographics. Grounded in multimedia learning, dual coding, and cognitive load theories, the case demonstrates course-wide production and deployment feasibility. It also shows how AI errors can be repurposed as prompts for critical analysis. Because no student-outcome data were collected, the paper reports instructional implementation and practitioner observations rather than causal effects on engagement or learning.

**Keywords:** management information systems, generative artificial intelligence, Microsoft Copilot, infographics, multimedia learning, AI literacy, instructional design

## INTRODUCTION

Management Information Systems courses introduce students to interconnected technical and organizational concepts, including enterprise systems, databases, cybersecurity, networking, cloud computing, business analytics, artificial intelligence, and digital transformation. Textbooks, slides, recordings, demonstrations, and assigned readings remain central to instruction, but lengthy or text-heavy materials may make it difficult for students to identify essential ideas and relationships.

Infographics offer a supplemental representation by combining concise text, diagrams, icons, visual hierarchy, and spatial organization. Their use and creation in higher education have been associated with active learning and the development of digital, visual, and information literacy (Jaleniauskiene & Kasperiuniene, 2023). Elaldı and Çifçi (2021) reported a positive overall effect on academic achievement, while Çaka and Dursun (2022) found results favoring visually intensive infographic materials. Recent generative AI systems reduce the technical barrier to creating instructional visuals. Microsoft Copilot can assist

with summarization, draft generation, and infographic creation, but its outputs may include inaccuracies, omissions, weak visual emphasis, or inaccessible design choices. Instructor review therefore remains essential.

Unlike studies centered on a single instructional visual, this teaching case documents a semester-long AI-supported visual learning ecosystem consisting of 20 chapter billboards, post-quiz answer infographics, approximately 50 focused concept posters, AI-error discussion activities, and more than 200 company-selection infographics. The contribution is practical: it demonstrates how one instructor integrated AI-generated visuals across chapter learning, assessment feedback, and project preparation while maintaining instructor oversight.

## LITERATURE REVIEW AND THEORETICAL FOUNDATION

### Student Engagement in Online Learning

Martin and Bolliger (2018) found that students valued regular instructor communication, clear grading expectations, authentic projects, and structured interaction. Kuznekoff (2020) documented incomplete viewing of online video lectures, and Guo et al. (2014) recommended shorter, focused video segments. These findings support intentional use of multiple representations through which students can encounter and revisit course concepts.

### Educational Uses of Infographics

Jaleniauskiene and Kasperiuniene (2023) identified both instructor-provided and student-created infographics across higher education. Elaldı and Çifçi (2021) reported a positive overall effect on achievement, although aggregate evidence does not mean that every infographic benefits every task. Çaka and Dursun (2022) distinguished visually intensive infographics from text-intensive and text-only designs, reinforcing the importance of meaningful visual organization.

### Cognitive Theory of Multimedia Learning

Mayer's (2021, 2024) Cognitive Theory of Multimedia Learning proposes separate channels for verbal and visual information, limited processing capacity, and active cognitive processing. Meaningful learning entails selecting relevant information, organizing coherent representations, and integrating those representations with prior knowledge. Infographics may support this process when words and graphics jointly direct attention and clarify relationships.

### Dual Coding and Cognitive Load

Dual coding theory proposes interconnected verbal and nonverbal representational systems (Clark & Paivio, 1991). Cognitive load theory emphasizes the limited capacity of working memory (Sweller et al., 1998). Together, these perspectives support concise, coordinated visual representations while warning against excessive text, decorative clutter, inconsistent labels, and unclear pathways.

## CONCEPTUAL FRAMEWORK

The conceptual framework is intentionally simple. Existing course materials served as the starting point, Microsoft Copilot assisted with transforming those materials into visual drafts, the instructor reviewed the drafts, and approved artifacts were deployed within the course. The sequence is course materials, AI-assisted generation, instructor review, and instructional use.

Instructor review appears between AI generation and student access because AI output cannot be assumed to be accurate, accessible, or instructionally appropriate. Review addressed factual content, answer accuracy, readability, accessibility, alignment with course objectives, and assessment integrity. This step was especially important for quiz-answer infographics, which contained between zero and three incorrect AI-selected answers and required item-level verification.

After review, the artifacts supported three functions. Twenty chapter billboards provided one visual overview for each chapter. Post-quiz answer infographics supported review and, when incorrect AI responses were used instructionally, discussion-board activities. More than 200 company-selection infographics helped students review possible companies before beginning the company-analysis term paper.

The framework describes documented implementation rather than a tested causal model. Engagement, achievement, retention, critical thinking, and transfer remain outcomes for future empirical research.

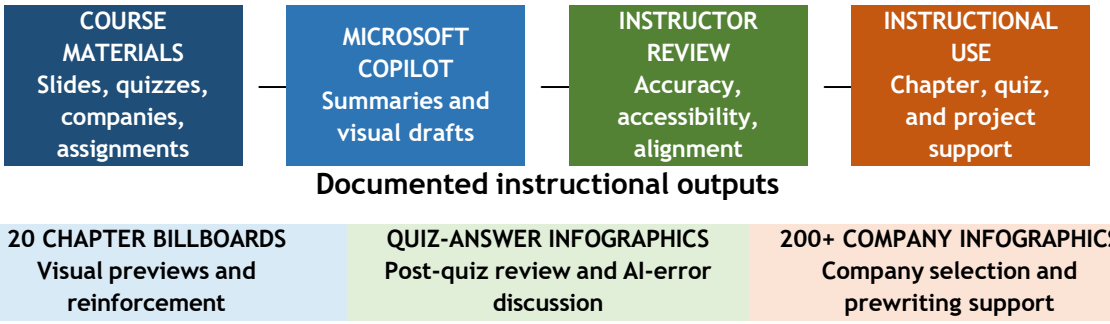



**Figure 1: Simple Conceptual Model of AI-Supported Visual Learning Materials in MIS Education**

Note: The model describes documented course implementation. Student learning and engagement outcomes were not measured and remain subjects for future research.

### Evolution of AI-Generated Infographics

Over approximately one academic year, the author observed changes in the usability of AI-generated infographic output. Earlier examples frequently contained malformed text, inconsistent spacing, weak hierarchy, and sections requiring correction. Later output generated from the same short prompt appeared to contain clearer typography and organization. This comparison is observational because model versions, settings, generation counts, and selection procedures were not controlled.

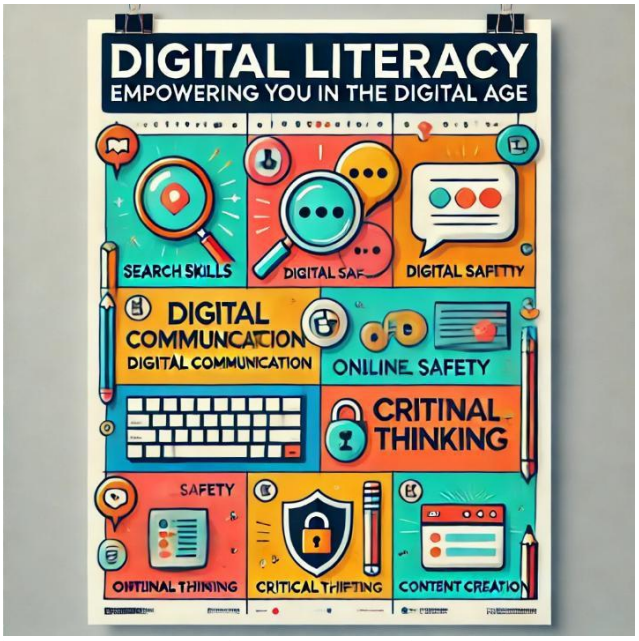



**Figure 2: Digital literacy infographic generated in Fall 2025 (not quite ready for production).**

Note: Generated with ChatGPT from the prompt "Create a poster on digital literacy."

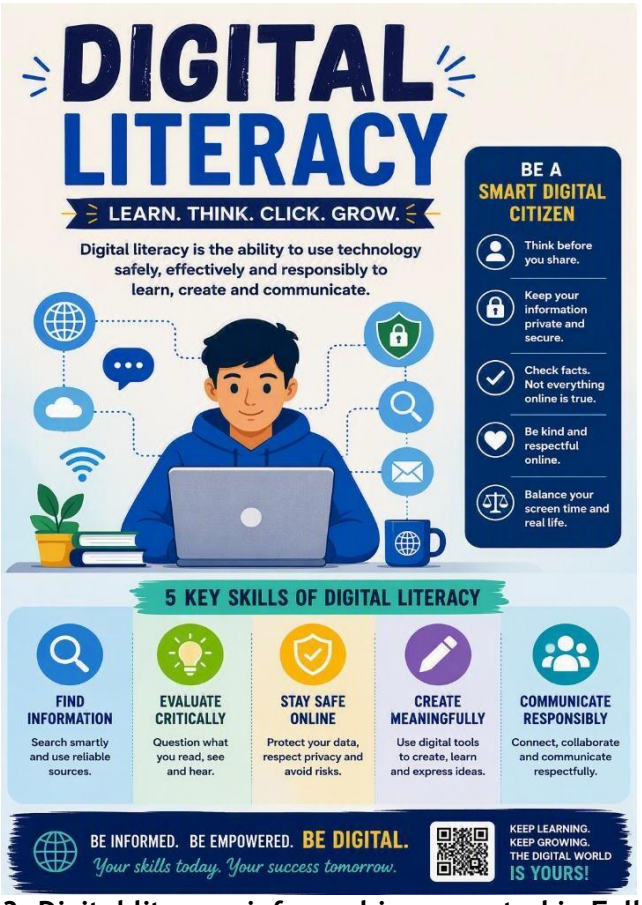



**Figure 3: Digital literacy infographic generated in Fall 2026.**

Note: Generated from Microsoft Copilot with the same prompt as Figure 2; the comparison is observational.

# METHOD

## Research Design

This study employed a descriptive teaching-case methodology to document course-wide production, instructor review, and LMS deployment. It did not test a causal relationship between infographic exposure and student outcomes.

## Research Questions

- **RQ1:** How can Microsoft Copilot be used to transform instructional materials across an MIS course into a coordinated visual learning ecosystem?
- **RQ2:** What review practices make AI-generated learning artifacts suitable for chapter learning, assessment feedback, and project preparation?
- **RQ3:** What instructional roles can AI-generated errors serve after assessment?

## Course Context and Assessment Structure

The case occurred in an undergraduate Management Information Systems course at Millersville University. The course enrolled 105 students and was delivered in an online format during Fall 2026. Chapter reading and quizzes accounted for 50% of the final grade. A company-analysis term paper accounted for the remaining 50%. Students selected companies through a name-based assignment process.

## Artifact Production

**Table 1: Artifact Production and Instructional Purpose**

| Artifact or activity | Quantity or sequence | Instructional purpose |
|---|---|---|
| Chapter billboards | 20 | One visual preview for each chapter |
| Focused concept posters | Approximately 50 | Additional explanation of selected concepts |
| Quiz-answer infographics | Approximately 20; released after quizzes | Post-assessment feedback and review |
| AI-error discussion boards | Used when incorrect AI answers were available | Identification and discussion of AI errors |
| Company-selection infographics | More than 200 | Company comparison and prewriting support |
| Chapter reading and quizzes | 50% of course grade | Content learning and assessment |
| Company-analysis term paper | 50% of course grade | Applied analysis and writing |

Note: Quantities reflect the instructor's course records and reported implementation.

## Artifact Development and Review

For chapter billboards, lecture slides and related materials were summarized and transformed into visual drafts. For quiz infographics, the complete multiple-choice

questions and answer choices were uploaded to Copilot. Copilot selected answers and generated an infographic. Each generated infographic contained between zero and three incorrect answers, so the instructor checked every answer against the verified key before release. Company information was used to create more than 200 company-selection infographics. Across artifact types, review addressed accuracy, completeness, visual hierarchy, readability, accessibility, instructional alignment, and LMS deployment readiness.

### AI-Error Discussion Activity

When quiz infographics contained incorrect answers, students were asked after quiz completion to identify and discuss the questions Copilot answered incorrectly. The instructor observed lively exchanges, but no systematic measures of participation, discourse quality, engagement, or learning were collected.

### Scope of Evaluation

The evaluation was qualitative and descriptive. No student performance, retention, satisfaction, survey, interview, or behavioral data were collected for research. The findings therefore concern production feasibility, instructor review, deployment, and practitioner observation.

## CASE STUDY: A SEMESTER-LONG VISUAL LEARNING ECOSYSTEM

### Chapter Support

The course included 20 chapter billboards, one for each chapter covered. The billboards introduced principal concepts, vocabulary, relationships, and takeaways. Focused concept posters provided additional treatment of selected frameworks.

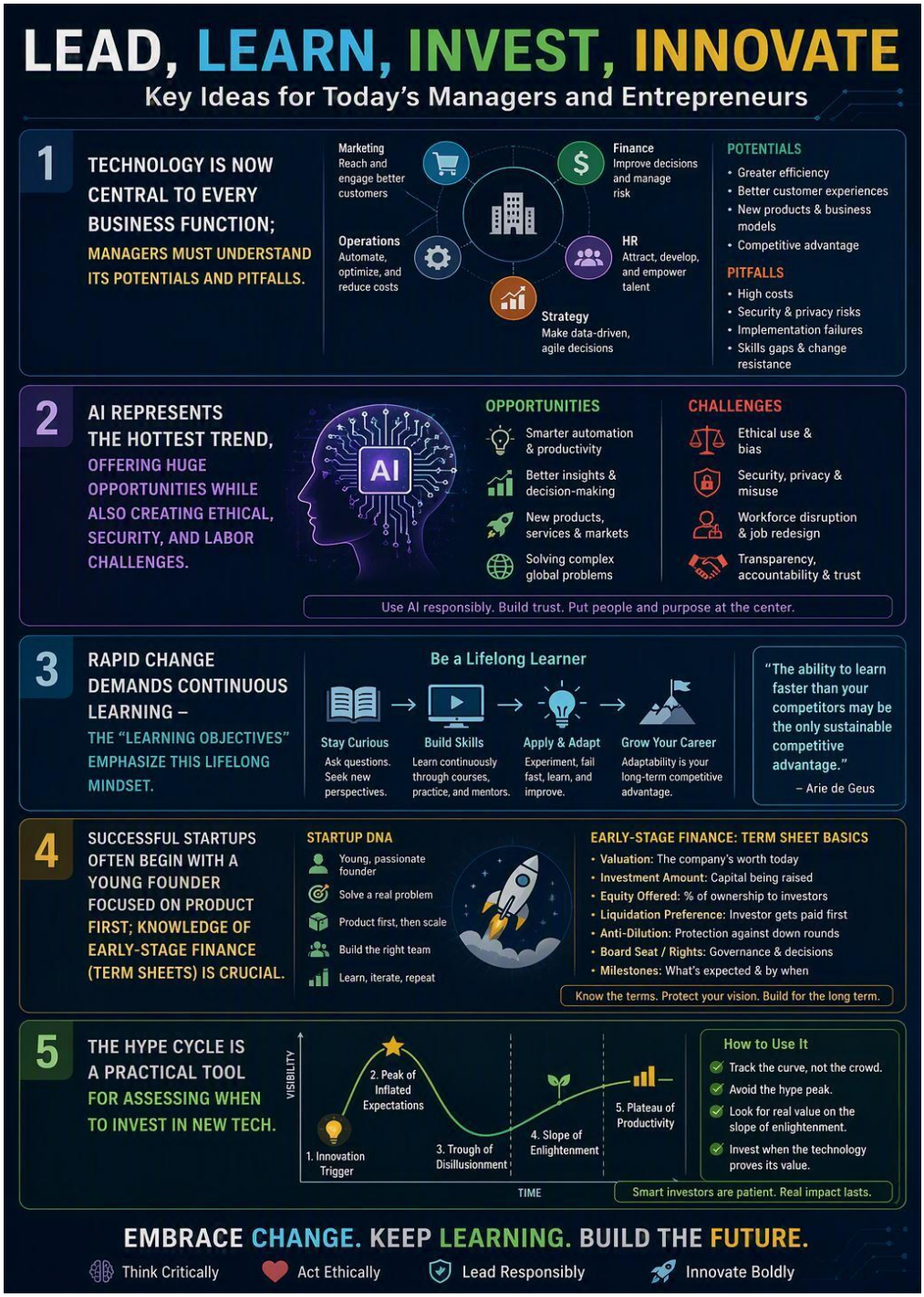



**Figure 4: Representative Chapter 1 billboard.**

Note: One of 20 chapter billboards created for the course.




**Figure 5: Focused poster explaining the Hype Cycle.**

Note: Generated with Microsoft Copilot and reviewed against course sources.

### Assessment Support

Students read each chapter and completed a quiz. After quiz completion, an instructor-reviewed answer infographic was released. Copilot was given the questions and answer choices and effectively took the quiz before generating the visual. The resulting zero-to-three error range made answer verification a required step.




**Figure 6: Representative post-quiz answer infographic.**

Note: Example of an infographic released after quiz completion and answer review.

### AI Error as a Learning Opportunity

The error-based discussion activity was the most distinctive adaptation in the case. Rather than treating incorrect AI answers only as defects, the instructor used them as objects of analysis. Students identified the questions Copilot answered incorrectly and discussed the reasoning supporting the verified answers. The observed exchanges were lively, suggesting a promising use of visible AI errors as prompts for critique and explanation. This interpretation remains provisional because engagement and learning were not measured.

**Project Support**

The remaining 50% of the grade consisted of a company-analysis term paper. More than 200 company infographics provided visual introductions to available choices before students began their research and writing. These visuals supported initial orientation without replacing independent company research.




**Figure 7: Representative company-selection infographic.**

Note: One example from the collection of more than 200 company infographics.

## RESULTS

### Course-Wide Feasibility

The workflow was applied across all 20 chapters and supported approximately 20 quiz-answer infographics, approximately 50 focused concept posters, and more than 200 company-selection infographics. This scale demonstrates repeatable production and deployment within one course.

### Instructor Review as a Required Control

Generation alone was insufficient. Instructor review addressed errors, omissions, readability, accessibility, alignment, and assessment integrity. The zero-to-three incorrect-answer range in quiz infographics made item-level verification essential.

### Three Instructional Roles

The artifact ecosystem served three roles: chapter orientation and reinforcement, post-assessment feedback and AI-error analysis, and prewriting support for the company-analysis project.

## DISCUSSION

The case extends the infographic literature by documenting a semester-long ecosystem rather than an isolated artifact. It shows how AI-generated visuals can be assigned distinct functions across a course while remaining subordinate to readings, quizzes, discussion, research, and writing. The chapter billboards and focused posters align with multimedia learning and dual coding perspectives because they coordinate verbal and visual representations. Cognitive load theory also provides a rationale for limiting density and ensuring coherent organization. These theories do not guarantee learning gains; they guide design and support future empirical questions.

The AI-error discussion activity represents a novel pedagogical contribution. It moves beyond correcting inaccurate AI output and instead makes the error visible for post-assessment analysis. Students evaluated the AI response against disciplinary knowledge and explained why a verified answer was more defensible. This activity may support critical AI literacy, but that proposition requires systematic testing. The company-selection infographics extended visual support into the prewriting phase of a major applied assignment. Their role was orientation and comparison, not substitution for research. Together, the three pathways demonstrate how visual artifacts can be integrated at different points in a course rather than used as interchangeable decorations.

## EDUCATIONAL IMPLICATIONS

### For Faculty

Generative AI can lower the technical barrier to producing visual drafts, but it does not eliminate instructional design or quality-control work. Faculty need a repeatable review process, particularly when visuals provide answers or other assessment-related information.

**For Students**

The ecosystem provided multiple representations of course content and positioned students not only as consumers of visuals but also as critics of AI output. The error-analysis discussions illustrate how inaccurate AI responses can become objects of disciplinary reasoning when used transparently and after assessment.

**For Curriculum Design**

The case suggests that visual learning materials can be planned across an entire course. Chapter previews, feedback visuals, and project-selection resources can be assigned distinct purposes and release points that align with the course sequence.

## LIMITATIONS

The case involved three courses, one instructor, and one institutional context.

No student-outcome data were collected, so the study cannot determine whether the artifacts improved engagement, achievement, retention, critical thinking, or paper quality.

The study did not measure whether students viewed, interacted with, or used every visual artifact.

The description of discussions as lively reflects instructor observation rather than a validated engagement measure.

Artifact evaluation was conducted by the instructor rather than independent raters, and the review criteria were not validated.

The study did not systematically analyze the types or causes of incorrect Copilot answers. Empirically, the Ai just hallucinated most incorrect answers by assuming the question asked something it didn't.

Production time, unsuccessful generations, and workload savings were not quantified.

A paid version of Microsoft Copilot was used. The free version available during the project permitted approximately 1 to 15 image generations per day, limiting the transferability of a high-volume workflow to free users.

The project did not compare Copilot-generated artifacts with instructor-designed, student-designed, or professionally designed alternatives.

## FUTURE RESEARCH

Future studies should compare AI-supported and conventional materials using immediate achievement, delayed retention, transfer, cognitive load, and LMS engagement measures. The AI-error discussion technique warrants focused study through content analysis, participation measures, comparison with conventional prompts, and tests of transfer to new AI outputs. Research should also evaluate whether company-selection infographics affect

topic confidence, time to begin research, source quality, or final paper performance. Independent raters could assess accuracy, accessibility, and visual quality, while time-on-task studies could quantify instructor workload. Research involving student data should receive appropriate institutional review.

## CONCLUSION

This teaching case documents a semester-long AI-supported visual learning ecosystem in an undergraduate MIS course. Microsoft Copilot assisted with 20 chapter billboards, approximately 20 quiz-answer infographics, approximately 50 focused concept posters, and more than 200 company-selection infographics. Instructor review remained central, particularly for quiz-answer visuals containing zero to three incorrect AI responses. The most distinctive contribution was the use of AI errors as prompts for post-assessment discussion and disciplinary critique. The case demonstrates implementation feasibility and identifies practical design controls, but empirical research is needed before claims can be made about engagement or learning outcomes.

## AI USE DISCLOSURE

The author used Microsoft Copilot throughout the development of the instructional materials and manuscript described in this study. Microsoft Copilot assisted with chapter billboards, focused concept posters, quiz-answer infographics, company-selection infographics, preliminary summaries, visual design ideas, organizational suggestions, and language editing. AI-generated outputs were treated as drafts and were reviewed for accuracy, alignment, accessibility, instructional suitability, and consistency with the study's purpose. The author reviewed, revised, verified, and approved all final content and assumes responsibility for the accuracy, interpretation, and conclusions. Microsoft Copilot did not replace scholarly judgment, data interpretation, or authorship.

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## APPENDIX A: REPRESENTATIVE PROMPTS

**Chapter Summary**

Summarize the key learning concepts from these chapter slides and organize them by major theme.

**Chapter Billboard**

Create an infographic summarizing the major ideas for undergraduate MIS students using concise language and clear hierarchy.

**Quiz-Answer Infographic**

Using the uploaded multiple-choice quiz, answer every question and create an infographic showing the selected answers for post-quiz review.

**Company-Selection Infographic**

Create a concise infographic introducing this company for an undergraduate MIS student considering it for a company-analysis term paper.

**AI-Error Discussion Board**

Identify each question Microsoft Copilot answered incorrectly, explain why the selected response is incorrect, and discuss evidence supporting the verified answer.