

From Burnout to Liberation: Conceptualizing the Arab Spring of Lesson Planning through AI-Integrated Workflow Optimization

من الارهاق الى التحرر: تصور الربيع العربي لتخطيط الدروس من خلال تحسين سير العمل المتكامل مع الذكاء الاصطناعي

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ملخص الدراسة:

تتقصى هذه الدراسة التحليلية تجربة خمسة عشر معلماً ومعلمة من صفوف المرحلة الابتدائية في الدولة الليبية، سبروا أغوار الذكاء الاصطناعي التوليدي عبر منصتي "ChatGPT" و "Claude AI" لترسيم خططهم الدراسية. وتكتسب هذه الدراسة أهميتها من خصوصية السياق التعليمي الليبي، وما يكتنفه من تحديات جمة، أبرزها الكثافة الطلابية في الفصول المزدحمة، وشح نوافذ التطوير المهني؛ حيث اتخذ المعلمون من هذه التقنيات الحديثة ملاذاً لابتكار المحاور التعليمية، وصياغة الأهداف، وتصميم الأنشطة والتقييمات.

استندت الدراسة إلى منهج وصفي نوعي، حيث استقت بياناتها من فيض خطط الدروس، والمقابلات المعمقة، واليوميات التأملية، والاستبيانات التحليلية. وقد كشفت النتائج عن دور محوري للذكاء الاصطناعي في اختزال زمن التحضير وإذكاء روح التفاعل في القاعات الدراسية، إلا أن ثمار هذه التقنية ظلت رهينةً بقدرة المعلم على تطوير المخرجات وتهذيبها. فقد أجمع المشاركون على أن الذكاء الاصطناعي مثل "شريكاً إبداعياً" حفّز دافعية الطلاب، لكنه وقع مراراً في فخّ الاغتراب الثقافي أو الزلل المعرفي، لاسيما في

رحاب اللغة العربية وعلوم الرياضيات، مما جعل المراجعة البشرية ضرورة لا غنى عنها. وتخلص الدراسة إلى حقيقة مفادها: أن الذكاء الاصطناعي، رغم ما يمنحه من كفاءة تدفقية، لا يمكن أن يكون بديلاً عن بصيرة المعلم وخبرته التراكمية. فالتكامل الناجح بين التقنية والتعليم يقتضي صقل مهارات المعلمين في هندسة الأوامر الرقمية، وضمان مواءمة المخرجات مع الهوية الثقافية والقيمية للمجتمع. **الكلمات المفتاحية:** الذكاء الاصطناعي التوليدي، تخطيط الدروس، التعليم في ليبيا، ChatGPT، التطوير المهني للمعلمين.

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ABSTRACT:

This case study examines how 15 Libyan elementary school teachers used chatG[T and Cloudai to prepare their lesson plans. Libyan educational context characterized by large class sizes and limited professional development, teachers utilized generative tools such as ChatGPT to generate topics, objectives, activities, and assessments. Employing a qualitative descriptive design, data were collected through lesson plans, semi-structured interviews, reflective journals, and surveys. The findings reveal that while AI significantly reduced preparation time for the majority of participants engaging activities, its utility was heavily dependent on teacher adaptation. Teachers reported that AI acted as a creative partner that enhanced student engagement, yet frequently produced content requiring revision due to cultural misalignment or inaccuracies, particularly in mathematics and Arabic. The study concludes that while AI offers substantial efficiency benefits, it cannot replace teacher expertise; effective integration requires professional development focused on prompt design and the cultural adaptation of AI outputs.

Keywords: Generative AI, Lesson Planning, Libyan Education, ChatGPT, Teacher Professional Development.

Introduction:

One key feature of any effective educational program is a clear plan. This is why a lesson plan is part of the teaching process. It helps to “establish a logical and correct connection between the designed objectives, lesson content, teaching and learning methods, and student learning assessment” (Farhang et al., 2023, p. 5905). The authors suggest that this process often takes place under heavy constraints. For instance, there are large class sizes in most of the classrooms (Abou Habil & Abu Lifa, 2020). Also, the ongoing training is very rare. In such conditions, it is difficult to create engaging and age-appropriate lessons (Sharif et al., 2023). Thus, many teachers rely only on personal experience to meet curriculum requirements. This leaves little time to experiment with new instructional ideas. Generative artificial intelligence has emerged as a tool that could relieve some of this burden. Platforms such as ChatGPT and Claude.ai can produce lesson objectives, activities, and assessments in minutes, tailored to a topic or grade level. As Setyaningsih et al. (2024) note, AI “accelerates lesson planning, supports differentiated instruction, and fosters creativity” (p. 685). However, it still requires teacher oversight to ensure relevance and accuracy. For educators in resource-limited settings like Libya, this combination of speed and adaptability offers a potential shift in how lessons are prepared.

This case study examines how fifteen Libyan elementary school teachers used ChatGPT and Claude.ai to prepare their lesson plans. The focus is on how AI helped them generate topics, activities, aims, procedures, and assessments. It considers whether it helped teachers improve the quality and organization of their lessons, reduce planning time, or enhance student engagement. The study also seeks to understand the degree to which AI outputs require adaptation for the classroom. The focus is on the experience of these teachers to provide insights relevant to both local educational needs and broader debates about AI in teaching practice. The research questions are as follows: How do Libyan elementary school teachers perceive the usefulness of ChatGPT and Claude.ai

in lesson planning? In what ways does AI influence the content and structure of lesson plans in this context? What impact do teachers perceive AI has on their workload and preparation time? How do teachers assess the effect of AI-assisted lesson planning on student engagement and learning outcomes?

Literature Review

AI in Education and Lesson Planning

Generative artificial intelligence is now popular in education for its potential to transform how lessons are conceived, structured, and delivered. Chat GPT, Claude.ai, and similar tools use large language models to generate text that can mimic human reasoning patterns (Lozić & Štular, 2023). “This capability allows AI to act as a structural scaffold for lesson design, helping teachers organize content more effectively.” This can generate immediate drafts of lesson elements. In practical terms, this feature allows educators to begin with a foundational plan and adapt it to suit their specific classrooms. According to Van den Berg et al. (2023), generative AI also promotes educational equity since teachers can access these resources regardless of location. However, they stressed that these models are not replacements for teachers. Instead, they work best when teachers critically review outputs to align with pedagogical standards and contextual needs.

Kehoe (2023) showed that AI can quickly create complete lesson plans and schemes of work with only minimal prompting. However, the same findings also revealed quality issues. For example, educators said it produced false references and inconsistent terminology. Thus, AI should not be taken as an independent planner. Instead, it still requires human judgment. In contexts where teachers face time constraints, such as in medical education described by Mondal et al. (2023), AI-assisted planning reduced preparation time. It also allowed educators to focus on refining lesson delivery. This practical value translates well to primary and elementary school contexts, where lesson preparation can be frequent and highly varied.

AI's Impact on Teaching Quality

Studies have examined how AI influences lesson quality and teacher creativity. Park and Park (2024) categorized teacher–AI collaboration into low, intermediate, and high levels. They noted that richer collaboration led to both content and pedagogical improvements in physics lesson plans. The highest benefits occurred when teachers entered the process with substantial prior knowledge. This suggested that AI's potential is maximized when teachers already understand both the subject matter and effective pedagogy. “in this way, collaboration between the teacher and AI directly influences the final content and structure of the lesson plan.”

Setyaningsih et al. (2024) studied Indonesian EFL teachers and found that AI tools supported differentiated instruction and idea generation. Teachers reported that AI suggestions expanded their repertoire of activities and strategies. However, these outputs still needed adaptation to local learning contexts and student needs. “By using AI to create these varied activities, teachers can improve student engagement and learning outcomes through more personalized instruction.” This balance between inspiration and customization emerges repeatedly in the literature. It reinforces that AI can trigger innovation but not replace the teacher's role in aligning lessons with cultural, linguistic, and policy realities.

In Qatar, Belloula (2025) found that AI tools improved lesson quality and student engagement by freeing teachers from administrative burdens. Teachers could use the time saved for creative planning and interactive instruction. However, concerns about over-reliance and gaps in AI training remained. Similar issues are likely in Libya, where many teachers may lack prior exposure to AI tools (Shrif & Jamoum, 2025).

Teacher Workload and Professional Development

A consistent theme across studies is AI's capacity to reduce teacher workload. According to Holmes et al. (2019), AI can generate personalized lesson materials aligned with curriculum standards. It can thus save teachers hours of preparation. “this

reduction in preparation time is one of the most significant impacts teachers perceive when using AI tools for daily planning.” However, studies also stress that these benefits depend on teacher readiness to work with this technology. Kerr and Kim (2025) reported that pre-service teachers in South Korea successfully used it for topic selection, material creation, and organization. However, these educators lacked skills in prompt design and pedagogical filtering. “This highlights that the actual impact on workload depends on the teacher’s skill in designing prompts and reviewing the output.” AI’s Professional development is deemed crucial to ensure AI is used effectively. Ismail et al. (2024) emphasized the role of AI in teacher education. It was noted that it can help teachers identify struggling students earlier and design interventions. This tendency depicts AI’s role beyond lesson drafting, into formative assessment and adaptive instruction.

Gaps in the Literature

“While recent studies begun to explore AI’s role in Libya Higher Education (Abolkasim & Hasan, 2024; Baroud et al., 2024), there is a notable absence of empirical data concerning primary education. This case study addresses this critical gap by, as elementary teachers face distinct pedagogical challenges such as higher student-to-teacher ration that are not present in the tertiary sector.” “This study fills this gap by exploring how Liban elementary teachers perceive the usefulness and impact of AI on their specific workload and classroom engagement.”

Methodology

Design

This case study employed a qualitative descriptive approach to examine how fifteen Libyan elementary school teachers used generative artificial intelligence for lesson planning. Case studies are well-suited to exploring complex processes in context. Creswell and Poth (2018) describe them as naturally sensitive to the dynamics of real situations. They allow the researcher to observe relationships, interactions, and the meanings participants attach to their

experiences. This design was appropriate because AI in lesson planning is not only a technical matter but also a human one. It is shaped by the teacher's subject expertise, comfort with technology, and classroom realities. The goal was to capture how AI tools like Chat GPT and Claude.ai were integrated into planning routines and how this influenced the teaching process.

Participants Profiles

The participant for this study were selected through *purposive sampling, a method chosen to insure the inclusion "information -rich cases" that could provide deep insights into AI integration in the classroom (Palinkas et al., 2015). This strategy allowed for recruitment of teachers from five different schools who met specific inclusion criteria: they were active educators in grades two through six and had at least one year of experience experimenting with AI tools in their professional practice. The participants were drawn from five schools. They taught grades two through six across subjects such as Arabic, mathematics, science, English, and social studies. Teaching experience ranged from three to twenty-two years. All had experimented with AI tools in the previous year, though in different ways. Some for creating exam questions, others for generating activity ideas or rewriting learning objectives. The group was diverse in technological comfort. One participant, a grade four science teacher with ten years' experience, used ChatGPT daily to craft lab activity instructions. By contrast, another grade six Arabic teacher had used AI only sporadically before this project, mostly to rephrase reading comprehension passages. Teachers worked with classes ranging from twenty-two to forty-five students, often in resource-constrained classrooms. Access to AI was through personal smartphones or shared school computers, with internet reliability varying across sites.

Procedures

The study began with an orientation workshop in which teachers reviewed the project goals and received training on prompt design for lesson planning. Each teacher was asked to use AI to

generate five complete lesson plans over the term and ensure at least one per subject they taught. The plans had to include topics, objectives, materials, activities, procedures, and assessment suggestions. Teachers began each lesson plan by drafting their own initial idea, then using ChatGPT or Claude.ai to expand or refine it. They documented the prompt they used and marked the AI-generated sections in the plan. They were free to adapt, delete, or rewrite any part. A grade three English teacher, for example, entered the prompt: “Create a 45-minute lesson for teaching the past simple tense to Libyan students aged 8–9, using local examples.” The AI suggested an activity about writing letters to historical figures. She replaced this with a game about narrating last weekend’s activities, which she felt matched her students’ energy level.

Lesson plans were submitted weekly. The researcher met with each teacher twice during the term for semi-structured interviews about their experiences. Teachers also completed a mid-term reflective journal describing the most and least helpful aspects of AI output.

AI Tools in Use

Chat GPT and Claude.ai were the only AI tools permitted for this study because most of the teachers had used at least one of them. Teachers were encouraged to experiment with both, but could choose one as their primary platform. Chat GPT was preferred by those seeking structured objectives and step-by-step procedures, while Claude.ai was valued for producing more conversational, locally adaptable language. Some teachers used both together, and combined Claude.ai’s text with Chat GPT’s structured activity lists.

Data Collection and Analysis

This study adopted a mixed-methods design, integrating qualitative, source (lesson plan, semi-structured interviews, and reflective journals analyzed thematically) with quantitative evidence (an end-of-term survey summarized using descriptive statistics) Data came from four sources: the submitted lesson plans, the initial and mid-term interviews, the reflective journals, and an end-of-term

survey. The lesson plans served as the primary artifact for tracing how AI shaped instructional design. Interviews and journals captured teacher perceptions and decision-making. The survey quantified perceptions of AI's effect on lesson quality, workload, and student engagement. Thematic analysis was applied to the qualitative data, coding for categories such as AI as inspiration, adaptation for culture fit, and efficiency gains. A matrix was created linking each teacher with to specific lesson plan elements they generated with AI. Quantitative survey responses were summarized in percentages to identify patterns. One illustrative lesson plan came from a grade five social studies teacher, who used AI to design a lesson on traditional Libyan crafts. The AI suggested a group research project using online resources. This teacher adapted it to a hands-on workshop where students interviewed older family members and brought items to class, which integrated cultural relevance with AI-generated structure.

Thematic analysis was applied to the qualitative data, coding for categories such as "AI as inspiration," "adaptation for cultural fit," and "efficiency gains." A matrix was created linking each teacher to specific lesson plan elements they generated with AI. Quantitative survey responses were summarized in percentages to identify patterns.

Findings

Teachers' Perceptions of AI Usefulness

The majority of teachers in this case study reported that ChatGPT and Claude.ai were valuable for creating structured lesson plans quickly. Eleven of the fifteen participants described AI as "time-saving" and "idea-rich." They appreciated that AI could produce coherent lesson structures the within minutes, offering activities, objectives, and assessments in one output. One participant, a grade four science teacher, noted that using AI reduced her planning time by half and thus made her free to focus on preparing materials for experiments. Others valued the creative

push. In this context, they said that AI suggested lesson hooks and games that teachers might not have considered.

Four teachers were more cautious. While they used AI extensively during the project, they felt its suggestions sometimes lacked sensitivity to local context. These teachers expressed that AI’s cultural assumptions could slip into activities. It thus requires careful screening and rewriting. For example, a mathematics teacher received a word problem involving snowball fights, something unfamiliar to her students. The tool replaced it with a scenario on date harvesting.

Impact on Lesson Structure

AI outputs influenced lesson structure in predictable but significant ways. Objectives generated by ChatGPT were often detailed and measurable. Most teachers said that Claude.ai tended to phrase them in more student-friendly language. Teachers combined these strengths, sometimes merging objectives from both tools. Activities suggested by AI often emphasized variety and alternated between group work, individual tasks, and discussions. Several teachers adopted these patterns indiscriminately. They noted that this improved the pacing and made transitions smoother. In assessments, AI excelled at producing formative tools such as quick quizzes, reflection prompts, and short-answer questions. However, teachers often modified them to fit curriculum standards better. A grade three Arabic teacher replaced AI’s multiple-choice comprehension questions with open-ended ones to encourage more expressive language use.

Categories of Generative AI Use Among the Teachers

Table 1 below maps each teacher’s use of AI across five key aspects of lesson planning. A tick mark indicates that the teacher used AI to create or significantly revise that component. Topic generation and activities were the most common uses, with all fifteen teachers engaging AI for these. Objectives and assessments were also widely generated, but more often adapted for clarity or alignment with national curriculum standards. Procedures were the

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least frequently used output, as many teachers preferred to structure their own sequencing based on class dynamics.

Table 1

Teachers (T)	Topic Generation	Objectives	Activities	Procedures	Assessments
T1	✓	✓	✓		✓
T2	✓	✓	✓	✓	✓
T3	✓		✓	✓	✓
T4	✓	✓	✓		✓
T5	✓	✓	✓	✓	
T6	✓	✓	✓	✓	✓
T7	✓	✓	✓	✓	✓
T8	✓		✓	✓	✓
T9	✓	✓	✓	✓	✓
0	T1	✓	✓	✓	✓
1	T1	✓	✓	✓	✓
2	T1	✓	✓	✓	
3	T1	✓	✓	✓	✓
4	T1	✓	✓	✓	✓
5	T1	✓	✓	✓	✓

Teachers’ Use of AI in Lesson Plans

Effect on Teacher Workload and Preparation Time

Survey data revealed three distinct patterns of workload reduction among participants. Nine teachers experienced a significant decrease in preparation time of at least 40% compared to their normal routines. Four teachers reported a moderate decrease of 20–30%, while two experienced minimal reductions because of the extra time they spent revising AI-generated content to fit their context. The most notable time savings were reported by teachers responsible for multiple subjects per week. They described AI as a

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“planning assistant” that removed the pressure of starting every lesson from scratch. One grade two English teacher explained that she could now prepare three complete lesson plans in the time it had previously taken her to prepare one.

Table 2

Reduction Level	Definition	Number of Teachers	Example Contexts
Significant Reduction	$\geq 40\%$ decrease in planning time	9	Multi-subject teachers produce several plans per week; AI is used to generate complete frameworks with minimal revision.
Moderate Reduction	20–30% decrease in planning time	4	Teachers who used AI for activities and assessments but still wrote most objectives manually
Minimal Reduction	$\leq 15\%$ decrease in planning time	2	Teachers who spent substantial time revising AI outputs for cultural or linguistic accuracy

Workload reduction

Impact on Student Engagement and Outcomes

Teachers observed increased student engagement in lessons that incorporated AI-generated activities. Students responded enthusiastically to role-playing exercises, problem-solving games, and creative writing prompts. Several teachers reported improved participation from quieter students when activities involved storytelling or small-group challenges. While formal achievement data were not collected in this short-term study, teachers felt that the varied approaches prompted by AI led to better retention of key concepts. One English teacher noted that “students remembered the vocabulary from the story activity much better than from the worksheet we used before.” A science teacher described how her

students retained key vocabulary from an AI-suggested group experiment more effectively than from previous lecture-based lessons. An Arabic teacher observed more detailed answers in written work after incorporating AI-designed discussion prompts.

Discussion

The findings of this case study show that generative AI tools played a meaningful role in lesson planning for Libyan elementary school teachers, though their value depended heavily on teacher adaptation, prior AI familiarity, and contextual alignment. Teachers in this study consistently described AI as a partner in creativity rather than a finished-plan provider. This depicts Van den Berg et al.'s (2023) observation that ChatGPT's greatest contribution is that it provides structured starting points for lesson content, and does not replace teacher expertise. Much like the Indonesian EFL teachers studied by Setyaningsih et al. (2024), Libyan participants valued the variety and novelty that AI introduced but needed to reframe content for cultural and pedagogical fit.

In Park and Park's (2024) classification of teacher-AI collaboration, many Libyan teachers operated at the intermediate level. This is a responsive interaction where AI suggestions prompted changes in lesson structure but still required teacher-led refinement. Only a few exhibited the high-level, elaborative interaction where both content and pedagogy were deeply transformed through AI. This may reflect the limited digital infrastructure and training available in Libya, as well as the relatively short period of sustained AI use in this study. Interestingly, the consistent use of AI across all aspects of lesson planning in this study goes beyond what Park and Park (2024) found in their work with pre-service teachers. As noted in their study, collaboration levels varied by task, whereas the study's design encouraged full integration. This suggests that structured exposure to AI in a project format can lead to broader adoption. The data also support Belloula's (2025) findings from Qatar, where AI reduced

workload and increased engagement but raised concerns about over-reliance and uneven teacher readiness. In both contexts, teachers approached AI cautiously and balanced enthusiasm for its efficiency with awareness of its limitations.

Three factors shaped how teachers used AI: prior familiarity with generative tools, subject taught, and classroom resources. Teachers with more AI experience moved quickly from basic prompts to more elaborate queries to produce outputs that required minimal rewriting. Those not experienced entered vague prompts, which produced generic content. This notion depicts Kerr and Kim's (2025) emphasis that prompt design is a skill that educators need.

The other issue was the subject matter, which affected adoption patterns. For example, Science and English teachers embraced AI-generated activities more readily than mathematics and Arabic teachers. In this context, AI was good in the sciences since it can give new experiments that teachers might not have considered. In English, it can effectively generate creative writing prompts and dialogue exercises. However, it failed to match curriculum expectations or relied on culturally irrelevant examples in Arabic and mathematics. The teachers had to revise a lot in these two subjects. Resource availability was also a critical factor, where teachers in better-equipped schools could easily implement AI-generated activities. In other settings, educators had to strip activities down to their simplest form. This depicts the challenges noted in the literature. According to Setyaningsih et al. (2024), AI integration cannot be separated from broader infrastructural realities.

The clearest benefit was the expansion of idea variety. Teachers reported introducing games, role plays, and project-based tasks that they would not have designed independently. In science lessons, hands-on activities, like the evaporation experiment, made abstract concepts tangible. In language lessons, storytelling and creative role-play engaged students who typically remained quiet. These examples reflect Mondal et al.'s (2023) findings that AI can broaden instructional techniques by offering fresh perspectives.

Time efficiency was another frequently cited advantage. Most teachers experienced shorter planning sessions, even if not all saved the same amount of time. The reduction was most significant when AI-generated materials needed only moderate adjustment, as was the case for teachers with strong prompt skills and clear lesson goals. This aligns with Holmes et al. (2019) and Kehoe (2023), who point to AI's capacity to quickly produce structured, curriculum-aligned content that teachers can then fine-tune.

Collaboration between teachers also improved. Several participants reported sharing prompts and AI-generated lesson outlines with colleagues. This informal exchange of digital resources created a small but notable professional learning network inside the participating schools. Such peer-driven adaptation of AI resources is less documented in the current literature but may prove essential for sustainable integration in low-resource contexts.

Despite these benefits, teachers identified several limitations. The most consistent was cultural misalignment. AI often produced examples, names, or contexts unfamiliar to Libyan students. While some teachers could easily adapt these to local realities, others found the process time-consuming. This concern reflects Kehoe's (2023) warning that AI outputs may sound plausible yet lack context awareness. Besides, there was a quality variation across subjects. For instance, mathematics teachers reported errors. Arabic teachers said that much of the content from the tools was excessively simplified and did not match grade-level expectations. This reinforces Van den Berg et al.'s (2023) caution that AI outputs must be critically evaluated before use. A less expected limitation was the feeling of over-dependence. Some teachers reported instinctively turning to AI for all lesson elements, even when they could have produced similar results independently. This reflects the caution raised by Belloula (2025) regarding over-reliance on AI at the expense of teacher autonomy.

One unanticipated outcome was that teachers began to internalize AI's structuring methods, using similar scaffolding even

when they planned without the tools. This suggests that AI may indirectly shape pedagogical habits. However, two teachers expressed concern that this influence might narrow their planning style over time if not balanced with independent creativity. Another surprise was the way students began to perceive AI-generated activities. In one English class, students guessed that a story prompt came from “the computer” and reacted with curiosity. Some even suggested prompts for the teacher to try. This hinted at a potential role for student–AI collaboration in the future.

There was also an emergent pattern of blended-tool usage. Teachers sometimes combined outputs from ChatGPT and Claude.ai to produce a more balanced lesson plan. They used Claude.ai’s more natural phrasing alongside ChatGPT’s structured objectives. This approach was not suggested in the orientation, but developed organically as teachers explored the tools. Finally, the study revealed a potential link between AI integration and professional identity. Teachers who viewed themselves as innovators tended to see AI as an empowering ally, while those with a more traditional view of their role approached it with cautious pragmatism. This depicts Belloula’s (2025) observation that attitudes toward AI are tied to broader beliefs about teaching and technology.

Conclusion and Recommendations

This case study showed that generative AI tools have practical value for Libyan elementary school teachers, mainly when used to support idea generation and diversify lesson activities. The teachers in this study used ChatGPT and Claude.ai to create topics, activities, objectives, procedures, and assessments, adapting them to their own classrooms. The most consistent gain was variety. Lessons incorporated more creative, interactive elements than before, and in several cases, this translated into noticeable improvements in student engagement. Time savings were also significant for many teachers, particularly those with well-developed prompt skills. A structured draft reduced the pressure of starting from a blank page. The process

also enhanced collaboration among colleagues since they could share prompts and outputs.

The findings have, however, shown that these benefits varied a lot. In some cases, it lacked cultural relevance or precision in subject content. Thus, more time was used to rewrite or replace portions. Despite this limitation, it is also evident that teachers' ability to critically evaluate suggestions mattered a lot. They needed skills to adapt them to local conditions and integrate them into the curriculum.

The findings suggest that professional development in AI use is crucial. Teachers require targeted training in the prompt design and evaluation of AI outputs. They also need to learn adaptation strategies for cultural and curriculum alignment. Of course, infrastructure and resources vary widely in contexts like Libya. Thus, training must also address offline adaptation. This entails translating AI-generated activities into formats that can work without relying too much on classroom technology. Also, educational policy should recognize AI not as a substitute for teacher expertise but as a planning assistant. It is crucial to support responsible adoption. For instance, administrators can provide clear guidelines on ethical use, data privacy, and the role of AI in lesson preparation.

Collaborative prompt libraries and lesson repositories can minimize repetition and enhance shared knowledge. This is why localized AI training models or content filtering systems are necessary. This would reduce the amount of rewriting needed and improve the immediate relevance of outputs. Besides, teachers should pair AI use with reflective planning practices, where they document why they keep, adapt, or reject AI suggestions. This would help maintain professional agency and guard against over-reliance. Future studies could examine student outcomes more directly, using pre- and post-intervention assessments to measure the academic impact of AI-supported lesson planning. Research could also explore cross-subject collaborations, where teachers from

different disciplines jointly develop lessons using AI. Finally, longitudinal studies could track whether AI use changes teaching practices over multiple school years and whether initial enthusiasm sustains over time.

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