

CE CRAFT CORNER

Optimizing Continuing Education for Health Professionals: Incorporating Instructional Design Principles and Frameworks for Effective Learning

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ABSTRACT

Medical writers who work in continuing medical education (CME) and continuing education (CE) are tasked with crafting resources for clinicians to stay up to date with the most recent advances in medicine. These CME/CE activities are designed to improve knowledge, competence, performance, and/or patient outcomes. For CME/CE to achieve these desired outcomes, medical writers can follow principles of instructional design during CME/CE development. At different stages of CME/CE development, medical writers can incorporate various conceptual frameworks and models. Commonly used frameworks to develop CME/CE activities include the plan-do-study-act cycle, Bloom's taxonomy, and Moore's levels. Medical writers can use these frameworks and models to help create learning experiences that are engaging and learner-centered, resulting in changed clinical behavior and improved patient outcomes.

Because the medical field continuously advances, clinicians may struggle to stay up to date with the latest developments in medicine. One way for them to stay informed is by relying on continuing medical education (CME) and continuing education (CE).¹ CME/CE that fulfill their purpose of changing clinical behavior is therefore critical for patients to benefit from advances in medicine. Unfortunately, CME/CE have not always used research findings from the learning sciences nor changed clinical behavior.² To ensure that CE fulfills its purpose, medical writers need to design CME/CE in a way that is engaging and learner-centered. Medical writers can help optimize learning by incorporating conceptual frameworks and models into the design of the CME/CE activity.

USING A FRAMEWORK

A framework commonly used for designing CME/CE activities is the plan-do-study-act (PDSA) cycle, an approach structured to continually assess and improve.³ The 4 steps of the PDSA cycle are to (1) plan, (2) do, (3) study, and (4) act (Figure 1).

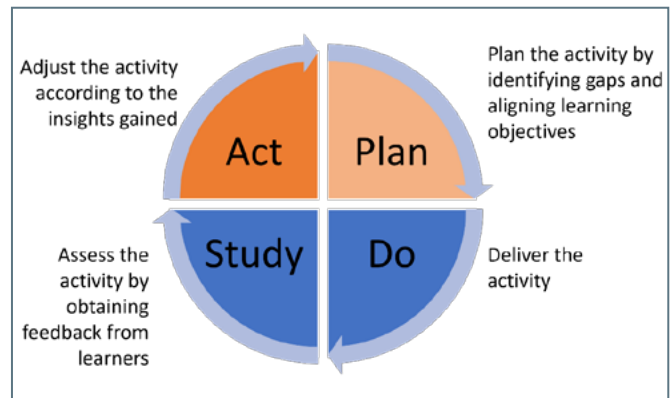


Figure 1. Steps of the PDSA Cycle.³

In the plan phase, practice gaps and educational needs are identified by performing a needs assessment. Practice gaps are defined as differences between health care processes or outcomes seen in practice and the processes or outcomes achievable using current professional knowledge.^{4,5} The insights gained in the plan phase are then used to design the CME/CE activity.¹ The plan phase is followed by the do phase, in which clinicians take part in the CME/CE activity. Once the CME/CE activity has taken place, the educators evaluate the activity for its effectiveness in the study phase. The evaluation involves gathering information by asking learners to answer test questions, take surveys, or respond to open-ended questions. Finally, the insights obtained in the study phase can be integrated into the activity in the act phase to make future activities more impactful and useful for subsequent groups of learners.³

Another model often used in CME/CE is the analysis, development, design, implementation, and evaluation (ADDIE) model.⁶ This 5-step model closely resembles the PDSA cycle. Both the PDSA cycle and the ADDIE model continually incorporate feedback into the activity to strengthen the relationship between education and clinical behavior.⁷ This article goes into more detail about each phase of the PDSA cycle.

WRITING THE NEEDS ASSESSMENT

In the plan step of the PDSA cycle, current gaps and underlying educational needs are identified in a needs assessment.⁸ When writing a needs assessment, medical writers are often asked to identify and research gaps in practice and to develop learning objectives and desired outcomes. These are then summarized in an alignment table. An example of such an alignment table is shown in Table 1.

Practice gaps are identified by comparing the actual clinical practice with the ideal clinical practice, also known as the professional practice gap.⁸ Gaps can be identified from several sources including medical literature, interviews with subject matter experts, and surveys among clinicians. Inferred gaps are often derived from guideline updates, drug approvals, and novel technologies, such as diagnostic tests. Verbalized gaps can be identified through interviews or surveys, making them a valuable source. Finally, statistical gaps can be derived from epidemiologic data or morbidity and mortality reports.⁸ When identifying gaps while planning CME/CE, medical writers need to keep the "end in mind," namely, improved patient outcomes and how these outcomes can be achieved.¹ Once these practice gaps have been identified, the medical writer looks for educational needs by examining the problems. Examining the problems helps to identify deficits in knowledge, strategy, skill, performance, or systems that could contribute to the problems.⁹

Sometimes writers are asked to develop learning objectives based on practice gaps they have identified, but it

has become common for writers to be asked to gather evidence to justify learning objectives that have been drafted in advance by the employer or client. In CME/CE, learning objectives are often developed using Miller's definition which delineates the progression from acquiring knowledge to translating knowledge into ability and implementing skills, abilities, and strategies into practice. Miller's definition, helps describe the knowledge, competence, and performance that learners should develop as a result of the CE activity.¹⁰ When developing learning objectives, medical writers need to consider that the objectives should be designed to close the identified practice gaps and address the educational needs. The medical writer also needs to consider which behaviors the learners need to improve in real life to deliver better care for patients. A helpful framework for designing learning objectives is Bloom's taxonomy. This framework classifies different levels of thinking and ranges from remembering facts and concepts to creating new or original work. Bloom's taxonomy is, therefore, a helpful framework to use when designing learning objectives. As shown in Figure 2, action words from the appropriate learning level should be used to develop learning objectives for the learner to understand which changes they should expect after completing the activity.³

CHOOSING THE EDUCATIONAL FORMAT

To ensure the learning objectives are appropriate, the medical writer should ask about the educational format before writing the needs assessment. The educational format

Table 1. Example of an Alignment Table

Practice Gap	Learning Objective	Desired Outcomes
Many patients with newly diagnosed advanced NSCLC do not receive biomarker testing. Oncologists may not be aware of current guideline recommendations for the pretreatment evaluation of patients with advanced NSCLC.	Describe the role of biomarker testing in patients with newly diagnosed advanced NSCLC.	Learners will improve their knowledge of the role of broad molecular profiling in identifying the most appropriate therapy for individual patients with newly diagnosed advanced NSCLC.
Many patients with newly diagnosed advanced NSCLC do not receive appropriate therapy despite biomarker testing. Oncologists may need education on available targeted therapies for advanced NSCLC.	Integrate recent clinical trial data on FDA-approved targeted therapies into the management of patients with newly diagnosed advanced NSCLC.	Learners will be able to use current evidence-based guidelines to make informed treatment decisions for patients with newly diagnosed advanced NSCLC.
Oncologists may have limited knowledge regarding clinical trial data on emerging targeted therapies for advanced NSCLC.	Evaluate clinical trial data for investigational agents under development and their potential role in the context of existing NSCLC treatment paradigms.	Learners will improve their knowledge of investigational therapies in advanced NSCLC and incorporate this knowledge into treatment decisions.

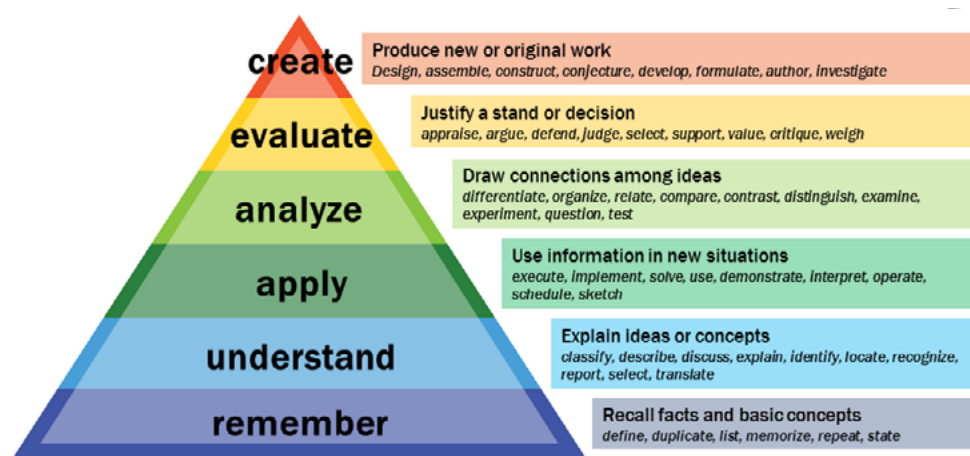


Figure 2. Bloom's taxonomy. Adapted from the Vanderbilt University Center for Teaching.¹¹

should match the objectives with the learning method. For example, if the learner needs to learn a new skill, the main teaching method should not simply ask the learner to read about the skill. Instead, the method should ask the learner to practice the skill through simulation or real-life experiences.¹² Several factors contribute to better learning in adults, including active contribution during the activity and the opportunity to practice what they are learning. Receiving feedback from faculty and peers during the activity in a setting that allows them to reflect on their learning helps solidify what they learned.¹³ Depending on the level of the learning objective, commonly used instructional methods include lectures, case studies, and simulations (Table 2).¹²

Table 2. Interface of Learning Objectives and Teaching Strategies¹²

Level	Teaching Strategy
Create	Projects, problems, case studies, creative exercises, develop plans, simulations
Evaluate	Case studies, projects, exercises, critiques, simulations, appraisals
Analyze	Problems, exercises, case studies, critical incidents, discussion, questions, test
Apply	Exercises, practice, projects, simulations, role play, microteaching
Understand	Questioning, discussion, test, assessment, learner presentations, writing
Remember	Lecture, visuals, video, audio, examples, illustrations, analogies

In recent years, multimedia and gamification have emerged as training platforms for CME/CE.¹⁴ Gamification platforms, such as educational games, mobile applications, and virtual patient simulations, can be used to increase

engagement and enhance collaboration.¹⁴

EVALUATING THE CME/CE ACTIVITY

Once the activity has taken place, a framework can be used to assess for how effectively the activity achieved changes in the learner's knowledge, competence, and performance, as well as patient outcomes.¹⁵ Several frameworks are used to evaluate CME/CE activities, including the reach, effectiveness, adoption, implementation, and maintenance (RE-AIM) frame-

work, the Kirkpatrick-Barr framework, and Moore's levels. The RE-AIM framework evaluates the impact of the activity on public health, whereas the Kirkpatrick-Barr framework and Moore's levels assess the learner's educational outcomes.

Moore's levels are the most commonly used framework for evaluating outcomes in CME/CE. This framework assesses the educational outcome on 7 levels, ranging from participation to community health (Table 3).^{3,15} Moore's levels were developed to combine assessment efforts with planning and teaching throughout the learning process. Participation and satisfaction are easy to assess using feedback surveys. However, these factors do not provide information on how much the participant learned during the activity and whether the acquired knowledge is integrated into clinical practice. Improvements in learning and knowledge gaps can be evaluated in different ways by asking the learner to answer pre- and posttest questions. Competence can also be assessed by analyzing reflective statements after the activity, and commitment to change can be gauged by semistructured interviews.³ Finally, improvements in patient and community health can be estimated at a later time by studying administrative databases and epidemiological data and reports.

SUMMARY

Medical writers who work in CME/CE develop resources for clinicians to stay up to date with the most recent advances in medicine. Effective CME/CE are vital to change clinical behavior and improve patient outcomes. By incorporating instructional design principles and frameworks, medical writers can design CME/CE in a way that engages and centers on learners. Using frameworks that support continual improvement of CME/CE, such as the PDSA cycle or

Table 3. Moore's Outcomes Levels¹⁵

Level	Framework	Description	Potential Data Sources
1	Participation	Number of participants	Attendance records
2	Satisfaction	Degree to which expectations of setting and delivery were met	Questionnaires completed by participants after the activity
3A	Learning: declarative knowledge	Degree to which participants state what the CME activity intended for them to know	Pre- and posttests of knowledge; self-report of knowledge gain
3B	Learning: procedural knowledge	Degree to which participants state how to do what the CME activity intended for them to know how to do	Pre- and posttests of knowledge; self-report of knowledge gain
4	Learning: competence	Degree to which participants show, in an educational setting, how to do what the CME activity intended for them to be able to do	Observation in educational setting; self-report of competence; self-report of intention to change
5	Performance	Degree to which participants do what the CME activity intended for them to be able to do in their practices	Observation of performance in patient care setting; patient charts; administrative databases; self-report of performance
6	Patient health	Degree to which the patient outcomes improve due to changes in participants' practice behavior	Health status measures recorded in patient charts or administrative databases; patient self-report of health status
7	Community health	Degree to which outcomes of a community improve due to changes in participants' practice behavior	Epidemiological data and reports; community self-report

Abbreviation: CME, continuing medical education.

ADDIE model, can help achieve this goal. These frameworks include developing a needs assessment to identify gaps and align learning objectives. Using a framework to continually evaluate CME/CE activities after they have taken place helps to improve the activities and shows the value of CME/CE for patients and the health care community.

Acknowledgments

I thank Haifa Kassis, MD, and Crystal Herron, PhD, for reviewing and making recommendations for improving the article.

Author declaration and disclosures: *The author notes no commercial associations that may pose a conflict of interest in relation to this article.*

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