

Basic Module: The 7 AO Principles of Quality Education

1. Introduction to the AO Faculty Compendium

1.1 How this online resource came to be

The involvement of a clinical specialty society in the education of its members is a hall mark of the AO approach. Education has always been one of the most important aspects of the AO since its formation in 1958 as explained by one of AO's founding fathers, Thomas P Rüedi, MD, FACS, "[w]hen the AO was founded [...], one of the principles was to provide education to surgeons in the use of the revolutionary techniques of open reduction and internal fixation of fractures" (1). Today, approximately 7,700 (status 2015) faculty members worldwide provide high-level education at AO educational events.

To document the principles that lie at the core of AO educational events, the AO in 2005, published the text book "AO Principles of Teaching and Learning", edited by Joseph Green, PhD and Piet de Boer, FRCS. The AO Faculty Compendium has been created due to the need to update the previous resource after ten years of faculty development activities and the creation of the *7 AO Principles of Quality Education*. As the chapters of the text book, the modules of this compendium are written by authors from around the world, pairing AO surgeon faculty members with a professional educationalist to assure all critical perspectives are represented.

The purpose of this compendium is to deliver a central resource for AO faculty members as they undertake their educational roles within the society: lecturer, small group discussion facilitator, table instructor, practical director session moderator, online facilitator, coach, chairperson and educational leader. As an online resource the AO Faculty Compendium allows for continuous updating and assists AO faculty members in accessing relevant educational resources more efficiently. Now, AO faculty members can use the AO Faculty Compendium as their pathway into the vast resources developed to assist them in becoming outstanding educators.

1.2 The basic module: 7 AO Principles of Quality Education

The basic module introduces the essential *7 AO Principles of Quality Education*. In reviewing the research carried out over the last 50 years in the fields of educational and cognitive psychology and adult learning, the AO decided that it needed to base the design, development, implementation, and evaluation of its learning activities for surgeons on a subset of key quality principles.

"The 7 AO Principles of Quality Education are as significant for our education, as the basic principles of fracture management for our patient care", Kodi Kojima, former Chairperson of the AOTrauma Education Commission, points out. "In the treatment of fractures, we follow

principles like restoration of anatomy, stable fixation, atraumatic techniques, etc. to ensure the best outcome for our patients. In education we follow the 7 AO principles of Quality Education to ensure the best outcome for our learners”.

For many years, AO surgeons, professional educators, and staff have been working together developing the processes, procedures, models, and forms required to ensure that these practical educational principles come to life in the real world of health professional learning. This module features a brief description of each principle (Figure 1.2-1)—their meaning, some of the theoretical concepts behind them, and the implications for faculty.



Figure 1.2-1: The 7 Principles of Quality Education are the cornerstone of all AO educational events.

1.3 References

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1. Based on needs



1.1 Knowledge, competence, and performance gaps

Gaps are the differences between what is and what ought to be, between what is and what could or should be. Understanding these gaps is a critical step in determining what a learner knows (knowledge), what a learner is capable of performing (competence), and what a learner actually does in the practice setting (performance).

To define if an educational activity can close a gap; the educator needs to answer the following questions:

- Does the identified gap at least partially exist because surgeons lack knowledge or understanding of a concept? Can the gap be defined in terms of knowledge, skills, or attitudes?
- Is the gap caused by other factors such as health-system problems, lack of adequate resources, cultural differences, or reimbursement issues?

If the first question is answered with "yes" but the second with "no", creating an educational intervention is appropriate. If not, it will be a waste of money and effort trying to solve that problem with only knowledge-based solutions.

According to Moore, Green, and Gallis in their journal article on achieving desired results and improved outcomes, "interactive [continuing medical education (CME)] that engages learners, helps them reflect on current practices, identifies a gap between their current performance and a standard, and then requires them to practice what they are learning with feedback to close that gap tend to be more effective in changing performance" [1] .

Over the last decades, the medical education community elevated its desired outcomes for educational activities from the lowest level of "learner satisfaction with the event" to higher levels, such as, "learning", "application of learning to impact competence or performance in the practice setting", "improvement of patient outcomes and community health". As expected, each higher-level outcome has brought more credibility to the community, but has been increasingly difficult to measure.

These quality educational processes and outcomes are not dissimilar to the way physicians and surgeons ideally care for patients in the health care setting (Fig. 1.1-1). They always

gather data before making a diagnosis, continue gathering data as they refine their analysis of the patient's problem, determine the best possible intervention, implement the treatment plan, and evaluate how it solved the patient's problem. Both the educational and clinical patient care planning processes are problem-solving methods. Both clinicians and educators want their interventions to result in positive outcomes requiring both professional groups to follow the research regarding possibilities and limitation in patient care and the design of effective learning experiences.



Fig. 1.1-1: These graphics show the similarity between the medical surgical model and professional education model for process decision making.

1.2 Faculty selection

Content for educational events should never be selected based on faculty member's preferences, but rather on what is needed to fill the performance gaps of learner's. Faculty members have expertise in many medical areas, but might lack expertise in areas where learner's show competence or performance gaps. Chairpersons need to define the event content based on the learner's knowledge gaps before faculty is selected.

1.3 Linking new knowledge to previous experience

A very important function of faculty is helping learners identifying new content and how it fits with their existing knowledge about a given subject. Learners should perceive the target of learning as part of an integrated whole. They need to understand how the new knowledge fits within their current situation and their work or learning environment. Providing self-assessment instruments at the beginning of learning experiences greatly assists in this effort. In order to recognize their knowledge gaps faculty should:

- Make learners aware of what they do not know.
- Let learners know how their clinical performance compares to guidelines and the performance of their peers.
- Provide learners with the motivation to learn.

Once health professionals recognize their knowledge gaps their motivation to learn is immediately increased. However, if the gap between current and ideal performance is too large, an aversion to learning could develop. On the other hand, if the perceived gap is too small, there may be too little or no motivation to improve. Thus, closing the gap needs to feel achievable [2, 3].

1.4 Barriers and strategies

Applying the teaching content in the practice setting is another critically important function of learning for surgeons and other health care professionals. To assist in this process, understanding the work setting of learners and its barriers for applying acquired content is essential. In addition, devising strategies allowing to successfully overcome such barriers and including this information in their clinical talks is crucial (Fig. 1.4-1).

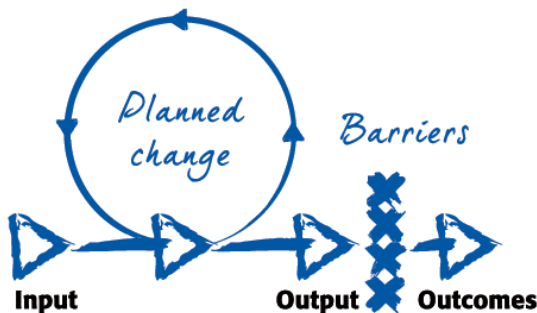


Fig. 1.4-1: The barriers compromise the translation of the output into the desired outcomes.

1.5 Continuous evaluation of learning activities

In order to maintain and improve the quality of educational offerings, continuous and consistent evaluation is crucial. This process not only involves self-assessment of learners, but also gathering data on the learners for their own benefit and the faculty's. Additional data gathering during the learning activity indicates to the chairperson and faculty how well the event is meeting its learning objectives, so mid-event corrections can be made, if necessary. After the learning experience, it is important to evaluate if the learners can apply what they learned in their practice setting.

An effective evaluation concept:

- Contains the most important concepts acquired to enhance clinical performance.
- Provides immediate feedback to learners and faculty.
- Allows comparing results with peers.
- Tests for application of knowledge in real world settings (competence).
- Uses the same items for pre and postassessments,
- Uses multiple choice questions to assure the learner's ability to make fine distinctions.

The AO, together with its Clinical Divisions, has created a central evaluation and assessment concept consisting of tools, systems, and workflows allowing staff and faculty to collect and analyze data and create consistent reports for internal and external stakeholders. Those practical reports present data from a range of pre and postevent activities facilitating chairpersons' understanding of their participants and of the measures necessary for optimizing their learning experience, and ultimately, impacting patient outcomes. Thus, AO has the opportunity to measure the effectiveness of educational events and to improve the planning of future events.

For its reports, the AO collects different kinds of data at different stages of the educational activity, for example:

Before the educational event:

- Demographics (years of practice, number of cases per year)
- Current and desired level of ability (in regard to learning objectives)

During the educational event:

- Content usefulness and relevance.
- Faculty effectiveness.

After the educational event:

- Likelihood of using information.
- Absence of commercial bias.
- Overall rating.

For more information on the content and use of AO evaluation and assessment reports please visit the AO Assessment & Evaluation website: <http://eval-guide.aomeducation.org>.

1.6 Practical implications

In order to ensure that your educational event is based on needs, you have to:

- Understand the realities of your audience, their training and background, as well as barriers to learning and change that might confront them.
- Identify the health care problem the learning experience is trying to solve.
- Facilitate self-assessment of learners prior to the learning activity to determine knowledge, competence, or performance gaps.
- Ensure decisions about content, faculty, and methods are based on the learning objectives and resolve the health care problem.
- Assure that content is not commercially biased.
- Use case studies whenever possible to determine the degree to which learners can apply the teaching content.

- Allow learners to know what they do not know.

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1.8 Further reading

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2. Motivates to learn

2.1 What is motivation?

In a chapter on the relationship of motivation to learning, Cordes describes motivation as the “combination of forces, both intrinsic and extrinsic that initiates and propels behavior and determines its intensity” [1]. Cofer and Appley described three factors that affect motivation: firstly biological (emotions, drive, instinct, need), secondly mental (urge, wish, desire and demand), and thirdly goal object (purpose, interest, motive, incentive, goal, value) factors. They all represent psychological and physical states constituting the conditions affecting vigor, persistence, or direction of behavior [2].

2.2 Motivated learners

Surgeons are typically motivated to learn under the following conditions:

- A new procedure has been released, possibly allowing for improved surgical outcomes.
- They are considering a new procedure or treatment option, but lack some important information.
- They are unaware of something that they need to know.
- Their colleagues know something they do not know.
- Guidelines and standards of care suggest that they should know something that they do not know [3].



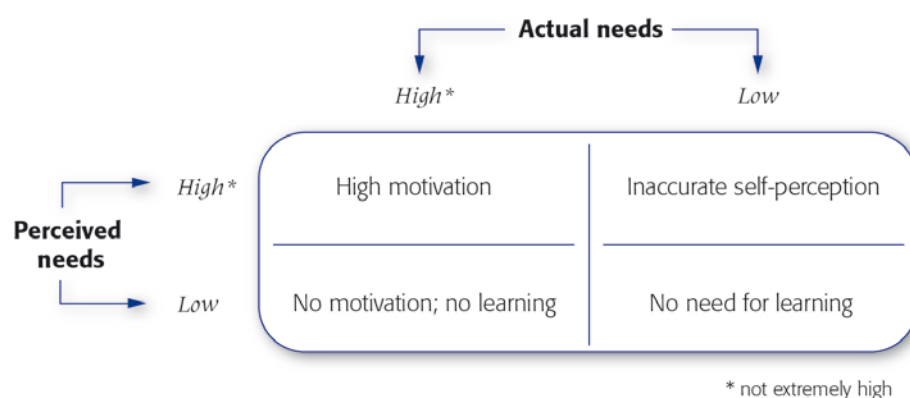
Fig. 2.2-1: If learners think they know everything they are not motivated to learn.

2.3 Discomfort from lack of knowledge

Identifying knowledge gaps serves as a major motivator for learning. Therefore, it is important for adult health education to obtain information regarding the participants' expectations. This data facilitates the planners' decision making concerning content, faculty, and educational processes. In order to gather this data, “courses often use pre-course needs assessment questionnaires that require event participants to reflect on their knowledge and patient care practices prior to an educational activity” [4]. In the AO, those self-assessments are based on defined competencies for educational events and consist of four items per

competency: two multiple choice questions testing knowledge regarding the competency and two so-called gap questions requiring the learners to indicate their perceived present level and their desired level of ability for this competency. Such a questionnaire can be easily created as an online survey and sent to the learners prior to the event. It is crucial that the learners see their own results in order to recognize their competence gaps. The assessment results should also be provided to the faculty and chairpersons to improve their understanding of the learner's motivational level, as it relates to specific competencies or event objectives.

When considering the results, it is important to understand that the knowledge gap affecting each learner's motivation is always the gap between the perceived present level and the desired level of ability, and that the discrepancy between these two affects the level of motivation for learning. The interactions between perceived and actual needs are summarized in the Figure 2.3-1 (adapted from Fox and Miner) [5].



Perceived and actual needs: how assessment results are be interpreted.

On the one hand, the optimal situation presents itself when a high perceived and actual need are present, as it results in high motivation. On the other hand, very large knowledge gaps are associated with high anxiety levels, which may lead to feelings of aversion rather than attraction, and are therefore, not motivating. The most difficult situation is characterized by learners who are under the impression that their performance is close to standard but in actuality is not. Thus, their perceived need is low but the actual need is high. In such a situation, the learner will not recognize any need to improve and the question is how motivation can be increased.

For adults, learning should be self-directed and they should decide on ways to close an identified knowledge gap. Fox and Miner stated that, "[m]otivation to participate in a specific learning activity will be greatest when the physician perceives strong or many goals, that

those goals are important, that participating in the specific learning activity is personally satisfying, and that participating will result in achieving goals" [5].

For more information on the content and use of AO evaluation and assessment reports please visit the AO Assessment & Evaluation website: <http://eval-guide.aeducation.org>

2.4 Stress and learner motivation

Stress causes hormonal reactions that can enhance sensory perception. Many educational theorists discuss the relationship between stress and learning. In contrast to enhancing learning, stress can also hinder it. In a chapter on learning theory and adult development, the authors state that, "emotions, stress and anxiety can all have an effect on learning [...] most adults enter learning activities in a state of arousal and do not generally require further motivation. Prolonged or excessive stress reduces one's capability to listen and communicate effectively" [6].

2.5 Practical implications

In order to ensure that your educational event motivates participants to learn, you have to:

- Aid the learners in recognizing their knowledge and performance gaps through, for example:
 - o Online self-assessments: based on your defined competencies, your learners can indicate their perceived present level and their desired level.
 - o On-site small group discussions: you can find out about the present level of knowledge and help learners in perceiving their actual level and their desired level. This is important when learners are under the impression that they are very knowledgeable (although in fact they are not) and would, therefore, lack motivation to learn.
 - o Reflection (see sub-chapter on "Promotes reflection"): reflective practice helps learners to identify their knowledge gaps.
- Maintain motivation through a variety of teaching methods:
 - o Interactive methods such as interactive lectures and small group discussions (see sub-chapter on "Interactive").
 - o New technologies allow for self-directed learning, you can provide online resources such as readings or recorded lectures/webinars.
 - o Traditional strategies blended with technology, eg, self-assessment tests can be completed online and linked to discussion forums.
 - o Provide learners with clear goals and outcomes.
 - o Provide time and opportunities for reflection.

- Adjust the learning activity content to the results of the pre-event assessment, if necessary.

2.6 References

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2.7 Further reading

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3. Relevant

3.1 Relevance for practice

Creating content for Continuing Medical Education (CME) activities without any knowledge of learners' practice realities and learning gaps can lead to unfortunate and nonproductive situations in which faculty provides answers to nonexistent questions. As Pennington, Allan, and Green explain, “from studies of adult development and learning and from research in the biological, social and behavioral sciences, there is now a better understanding of how adults learn. From this research and from experience, a different concept has emerged—learning centered around the needs and experiences of the learner” [1].

Malcolm Knowles, Alan Knox, and Cyril Houle have long been considered the three leading researchers in the field of adult learning and development. Knowles explained that adult learning is different from children's due to their increased experience, their focus on immediate problems, and their shift from subject to problem orientation. Knox explains the social, psychological, and developmental differences that influence adult learning. Houle dedicated much of his research and writing on how adult learning can be used to achieve excellence throughout a life time.

Sidebox

The vast research on learning in children is called *pedagogy*. The study of *self-directed learning for adults* is called *andragogy*. The primary difference between the two is related to the concept of *crystallized intelligence* signifying that adult learning grows like crystals onto existing knowledge, whereas children constantly form new neural connections since there is no experiential base. Knox has written a great deal about adults' global capacity to learn, reason, and solve problems, generally referred to as intelligence. He points out that there is fluid intelligence, the ability to reason abstractly which diminishes after age 20, and crystallized intelligence based on prior learning and experiences which intensifies with age until at least 60 or 70 years old. Pennington concludes that “when past experience can be

applied to a current learning task, learning is facilitated; when it is only modestly related to a current learning task, the learner may have problems integrating the new information into experience” [1]. Additionally, Knowles, one of the three top-experts (see side box) in adult education research, suggests that this theory is based on several basic assumptions about learner characteristics, such as, “learning moves toward a focus on immediate application and accordingly shifts from subject to problem orientation” [2].

3.2 Hierarchy of outcomes for learning experiences

George Miller, an internist involved in CME in the 1950s was studying clinical assessments of a physician’s practice and as a result, developed a hierarchy of outcomes (Fig. 3.2-1). At the top of the pyramid is the ultimate outcome—“does” which refers to the students’ ability to apply what they learned in their practice setting (referred to as performance). To reach this level, the learner first needs to “show how”, ie, demonstrate the application of knowledge under observation of the instructor (referred to as competence). Before being able to “show how”, students must learn to “know how” to apply knowledge to a specific task (procedural knowledge). And to accomplish this, they need to “know” basic facts (referred to as declarative knowledge) [3].

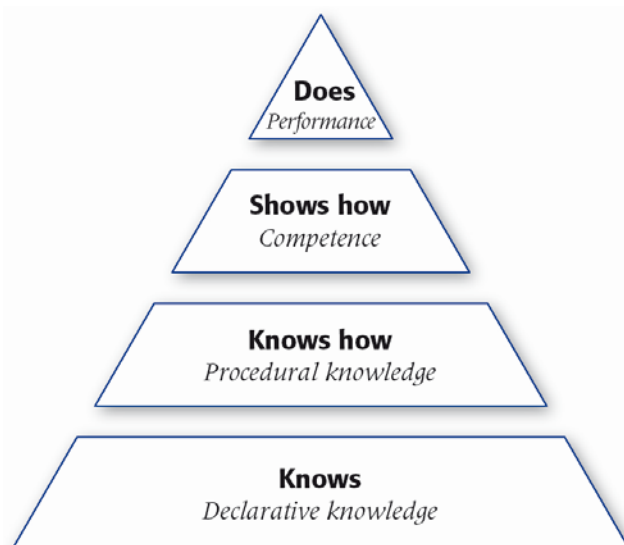


Fig. 3.2-1: The pyramid of educational outcome shows the progression that a learner should go through in his learning process.

3.3 Alignment of faculty, learners' needs, and content

Another important task of a faculty member, chairperson, or educational leader is aligning the content with the learners' needs and faculty's expertise. Means in his chapter on family physicians' use of information sources stated that “a major focus of CME should be practice-based problems, gleaned from day-to-day real life encounters that involve the highest incidence of morbidity and mortality” [4].

Based on such patient health issues and clinicians' performance gaps in treating them, the AO has developed curricula for its Clinical Divisions. These are based on the competencies clinicians require to close their performance gap, and are therefore, called competency-based curricula (for more information on the process of curriculum development, please consult the module "Backward Planning"). Competencies (abilities) are a combination of the specific knowledge, skills, and attitudes that enable surgeons and health care professionals to perform effectively in their practice setting and meet the standards of their professions. When planning an educational event, planners and chairpersons should use the competency-based curriculum (if available) corresponding to the event topic. These curricula leave room for adjustment to the learners' specific needs. In order to render the curricula most relevant for the learners, Means points out that the CME planner, chairperson, and faculty "must come to understand better those personal and situational characteristics of the physician that affect learning, as well as the various patterns of information seeking that the physician finds most functional in producing the desired outcome of increased competence in delivering patient care" [4]. Once the curriculum is finalized, adequate faculty is selected to ensure the learning outcomes of the curriculum are met. Faculty should be selected based on their content expertise and their comfort with the educational methods maximizing the learning outcome to meet the instructional objectives. The chairpersons and their faculty "teams" need to understand who the learners are, the characteristics of their practice environment, and how they perceive their needs or the needs of their care teams.

3.4 Practical implications

In order to ensure that the content of your educational event is relevant to your learners, you have to:

- Ensure that faculty understands the practice realities of learners.
- Select content based on how it relates to identified knowledge gaps.
- Focus on clinical problems and knowledge that can be applied in practice.

3.5 References

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4. Interactive

“Tell me and I shall forget; show me and I may remember; involve me and I will understand.”
An ancient Chinese proverb that gets to the heart of learning—the involvement of the learner is critical.

Sidebox

4.1 Relationship between involvement in learning and motivation

In a 1930s publication, John Dewey, an American Philosopher wrote that, “he has to see on his own behalf [...] the relationship between means and methods employed and results achieved [...] Nobody else can see for him and he can’t see just by being told [...]” [1].

Dewey was considered an educational pragmatist believing that learning needs a “hands-on” approach which was referred to as “progressive education”. Dave Davis, an internist wrote in 1999 that using interactive techniques (case discussions, role-playing, hands-on practice sessions) was more effective in changing performance of health professionals than traditional, formal continuing medical education (CME) lecture-based formats alone [2].

Learning has been defined by most observers as “the acquisition and creation of different types of knowledge that, through complex cognitive processes, leads to the development of new understandings, skills and capabilities” [3]. Referencing Davis article Moore, et al concluded that for CME to change physician behavior or health care outcomes CME needs to be “interactive...that engages learners, helps them reflect on current practices, identifies a gap between their current performance and a standard, and then requires them to practice what they are learning with feedback to close the gap tend to be more effective in changing performance [...] and, that multifaceted activities that combine several different interventions have been shown to be effective” [2].

Educational theorists agree that learning will not occur if the learner is neither listening nor engaged in the content. Two of the best approaches for engaging learners are to point out knowledge gaps and to emphasize the relevance for practice. Both of these approaches increase learner motivation.

According to Pennington “learners have organized ways of focusing on, taking in, and processing information or cognitive styles” [4]. Learning strategies are ways of organizing educational experiences both online and face to face. Physicians may be more homogeneous in terms of a common learning style related to their clinical problem-solving

model—history, physical examination, diagnosis, treatment, and follow-up. Using this model for organizing learning experiences is also thought to be most effective.

4.2 Interaction between learners and content, faculty, and colleagues/ **Predisposing, enabling and reinforcing**

Interactivity is an extremely important element in designing learning activities. There is not only interaction between the faculty and the learners, but also between the learners and their colleagues and between the learner and the content.

Dubin and Cohen describe a model of learning that encompasses motivational and personality variables, the educational environment and organizational factors [5]. This theoretical framework allows very traditional teacher-centered activities, along with more innovative learner-centered components. Since all learning theories emphasize the importance of attending to the learners' values "providing Continuing Education in the manner, time and place most desired by the learner" [5] should be superior to the faculty's preference.

Green and Kreuter developed a framework for designing effective learning activities. Rather than considering only methods to use in face-to-face learning activities, they propose faculty should focus on activities before the face-to-face event (predisposing), during the face-to-face event (enabling); and after the event (reinforcing) [3]. Predisposing activities increase the likeliness of a learner attending an educational activity as they are usually available over a longer period of time and might therefore occur just at the right moment when a physician is ready to learn a new task ("teachable moment"). These pre-event activities may include recently published standards of care, or new technological advances in the profession.

Enabling activities signify specific methods providing learners with information regarding any discrepancies between the learners' perception of what they think they know and what they actually know. Finally, reinforcing activities refer to materials that "strengthen the cognitive imprint of what was learned so that it can be more readily recalled during patient encounters" (Fig. 4.2-1) [3].

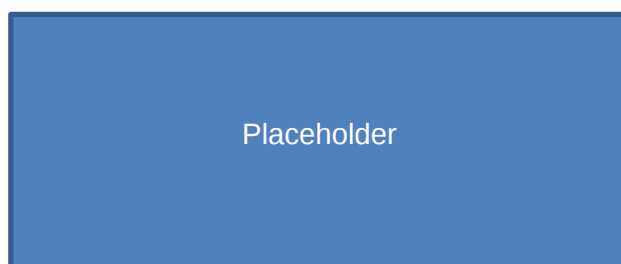


Fig. 4.2-1: The triangle illustrates different ways in which student, content, and teacher can interact in order to achieve higher-level outcomes.

4.3 Selecting best methods to reach the learning outcomes

In their article on choosing methods for instruction, Thomas and Kern emphasize that decisions by a chairperson or planning committee on teaching methods should be based on the goals and objectives of the learning experience ie, which combination of methods and formats is most likely to be effective, given the content and background of the target audience [6]. These methods and formats may include: readings, lectures, discussion groups, case studies, demonstrations, role plays, and simulations. They point out that “*teaching* is what educators do, but *learning* is what happens within the learner. The job of teachers, therefore, is largely to *facilitate* learning” [6]. Each of these methods has its strengths and weaknesses. None of them is the best or worst option as the selection of a method depends on the goal as well as the target group of the learning experience.

Method Definition	Pro	Con
Lecture		
Small group discussion		
Practical exercise		
xxx		

Tab 4.3-1:

4.4 Practical implications

In order for your educational activity to be interactive you should:

- Keep in mind that only involved learners are motivated.
- Ensure that the learner interacts with faculty, the teaching content, and other—learners.
- Use interactive techniques, case studies, panel discussions, small group discussions, interactive lectures, and practical exercises.

4.5 References

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5. Provides feedback

5.1 The value of providing feedback to learners

In the mid-1960s, Gagne stated in his classic book *The Conditions of Learning*, „[s]ome means or other must be provided during instruction for [the learner] to perceive the results of [their] activity, to receive from the learning environment some feedback that enables [them] to realize that [their] performance is correct“ [1]. Gagne goes on to suggest that feedback is critical during the learning process in facilitating the actual learning experience or speeding up the learning process. In addition, other feedback mechanisms might occur after a learning sequence. One example would be exercises, case studies, or an assessment. „If the learner has been informed of the performance expected at the end of the learning, it is desirable that this expectation be fulfilled by permitting him the opportunity of checking his performance against an external standard“ [1]. Other purposes of feedback include facilitating transfer of knowledge to the work or practice setting and ensuring the retention knowledge.

Malcolm Knowles suggests that successful adult learning programs actually build into the „design of learning experiences provisions for the learners to plan—and even rehearse—how they are going to apply their learnings in their day-to-day lives“ [2]. He goes on to say that feedback „confirms correct knowledge and corrects faulty learning“ [3]. In addition, a common complaint among medical school graduates and residencies in the United States is that not enough feedback is provided to students, which in their opinion slows down the learning process.

Many studies have considered the way physicians learn and change. These studies describe the stages that physicians go through [4]:

- 1) Recognizing an opportunity for learning,
- 2) Searching for resources for learning,
- 3) Engaging in learning to address an opportunity for improvement,
- 4) Trying out what was learned; and,
- 5) Incorporating what was learned in the practice setting.

This self-directed approach is consistent with the early learning theorists' perception of an ideal method, but is perhaps not known or used in designing learning experiences for colleagues in formal continuing medical education (CME) events and other learning activities in health care. The learning activity presents a safe environment for clinicians to test new procedures or instruments that can potentially improve the quality of their patient care. Trying

out new procedures or discussing new ideas are the crucial benefits of CME activities and are essential in achieving the desired outcome of enhancing the physicians' competence and performance.

Practicing physicians receive significant amounts of feedback on their performance, both informal (ie, questions from colleagues, case-based discussions, patients with internet-stimulated questions) and formal (ie, hospital audit process, recertification programs, patient care simulation data, or pre-event needs assessment data). Providing this data to potential learners allows them to reflect on their current practice performance, and thereby, increases their motivation to learn [5].

5.2 One model of learning with feedback

If the goal of a given learning experience is to help physician learners to master new clinical skills in order to provide better patient care, feedback to those learners becomes critically important. The 4-part approach to instructional design created by Merrill involves the following methods: presentation, example, practice, and feedback (PEPF). Feedback becomes the most important element as it „provides faculty an opportunity to inform the learners of the difference between what they are doing and what they should do to improve“ [6]. Not only does this increase motivation for learning in general, it allows physicians to focus on what they need to learn to positively impact their future patient-care decisions.

Employing a case study at the beginning of a formal learning activity can provide immediate feedback to learners regarding their level of knowledge and, more importantly, their knowledge gaps. It also allows faculty to test their assumptions about what the learners' know and identify areas which may require adding more time or emphasis in different parts of the formal educational event. The PEPF model of learning starts with presenting facts about new or changing practice realities, provides many examples that allow physicians to enhance their understanding of new material, processes, or procedures, incorporates opportunities for practice of new concepts or procedures, and allows for adequate feedback from expert faculty.

5.3 Value of providing feedback to faculty

Providing feedback to faculty is also very important in the learning setting. Faculty need to know how well their presentations met the practice-based needs of their learners and how effectively they communicated with their audience. Without timely feedback to faculty from learners, improvements in these processes are unlikely.

Chairpersons who are committed to creating and managing an effective learning experience seek out feedback throughout the activity from their faculty teams, their learners, AO coaches, AO staff, and surgical colleagues serving as evaluators. They are interested in knowing how to improve the educational activity, just as effective surgeons seek out feedback from other surgeons, other members of their surgical teams, and patients themselves. The more information is provided, the more effectively they can decide on the value of each feedback item and on the importance of changing old habits or creating new, more effective approaches to either patient care or chairing a CME event.

As important as feedback is to your role as either a learner or faculty, most clinicians would agree that it is not provided as often as it should be. In general, people do not feel comfortable providing feedback and others do not feel comfortable receiving it.

LINK to coaching video

Video 5.3-1: Under this link you can find a video illustrating a successful coaching session according to the "4 steps of giving feedback"-model used in the AO.

5.4 Model for faculty feedback

Over the last few years, the AO has developed a method for providing effective feedback to faculty or learners that is based on a model first developed by Pendleton et al [7]. It features the tenet that providing *positive* feedback on someone's performance is much easier than having to be *critical* of a colleague. AO has adopted Pendleton's model and teaches chairpersons, coaches, and faculty to use it in order to increase the effective provision of feedback in the many clinical workshops held around the world. As described by Eric Parsloe, the chairman and founder of The Oxford School of Coaching and Mentoring, „[c]ommunication is a two-way process that leads to appropriate action [...] in the context of developing competence; it is not an exaggeration to describe feedback as the 'fuel that drives improved performance'" [8].

The AO feedback model adapted from Pendleton follows these steps:

- Ensure that the learner wants and is ready for feedback.
- Explain the feedback process to the learner.
- Ask the learner what went well.
- Share with the learner what you think went well.
- Ask the learner what they would do differently next time.
- Share with the learner what you think they could do differently next time.
- Make an action plan for improvement.

As summarized by Pendleton, „[t]his helps to develop a dialogue between the learner and the person giving feedback and builds on the learner's own self-assessment, it is collaborative and helps learners take responsibility for their own learning“ [7] and improvement.

The PEPF and the Pendelton model are very similar—they are both problem identification and problem solving processes, one targeted at the surgeon role and the other at the faculty or chairperson role.

Feedback is a mechanism utilized in many of the educational roles surgeons assume in the AO. Feedback from learners to teachers or chairpersons improves the quality of live learning activities. Feedback from students and chairpersons to faculty can enhance the quality of live lectures and small group discussions. Teachers providing feedback to learners about achieving (or not achieving) learning objectives should increase the number of students eventually meeting the objectives which increases the likelihood that learning is applied in the practice setting. Feedback from course evaluators or faculty to chairpersons should improve the educational event's potential for meeting the practice need of learners.

5.5 Practical implications

In order to ensure that your educational event provides feedback, you should:

- Identify opportunities for giving and receiving feedback using the AO feedback model (adjusted from Pendelton)
- Provide feedback to learners on learning, competence, and performance.
- Request feedback from learners and peers on faculty performance.

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6. Promotes reflection

6.1 Reflection and learning

Many educational theorists have considered the relationship between learning and reflection in the practice setting. Some have called this process „informal self-directed learning“ [1]. Kolb describes a learning cycle that identifies reflective observation as the „critical link between the learner’s concrete experiences and the formation of abstract concepts of changes in competence and practice that are subsequently tested in practice“ [2]. Kolb’s learning cycle is described in depth in Mann and Gelula’s chapter on facilitating self-directed learning, including a 4-stage learning process (Fig 6.1-1) [3].



Figure 6.1-1: The experimental learning cycle by Kolb shows how experience, reflection, conceptualization, and experimentation interact in creating effective learning.

This learning cycle characterizes a physician encountering a unique patient situation leading to both interest and concern (concrete experience). A time of reflecting on the experience and starting to gather more information on the situation follows (reflective observation). The next step involves a kind of re-evaluation of the experience considering what is known about it (abstract conceptualization). Finally, small experiments are undertaken to determine if there are more novel ways to approach the problem (active experimentation). Then the cycle repeats.

These ideas are consistent with the learning and change model hypothesizing that physicians are motivated to change most commonly due to professional, but also personal, and social forces [4]. „Changes made range from minor accommodations of routine practice to major transformations and usually involve a wide variety of resources including, but not

limited to, formal Continuing Medical Education [CME]. The process of change involves three stages: preparing to change, making the change and sustaining the change“ [5].

6.2 The reflective practitioner

Donald Schön builds on Kolb's theory and wrote two books about self-directedness in learning: *The Reflective Practitioner* and *Educating the Reflective Practitioner*. He is worried about physicians' education because „the majority of professional work focuses on solving problems characterized by uncertainty, ambiguity and conflicting values“ [6]. Schön is most concerned that formal medical education does not take these uncertain situations into account, and therefore, does not adequately prepare surgeons for their practice. Schön indicates that there are two reflective opportunities clinicians' practices: *reflection in practice* and *reflection on practice*. Together, these can provide practitioners with opportunities to learn from their practice realities as well as change and improve the care they provide to their patients (Fig. 6.2-1).

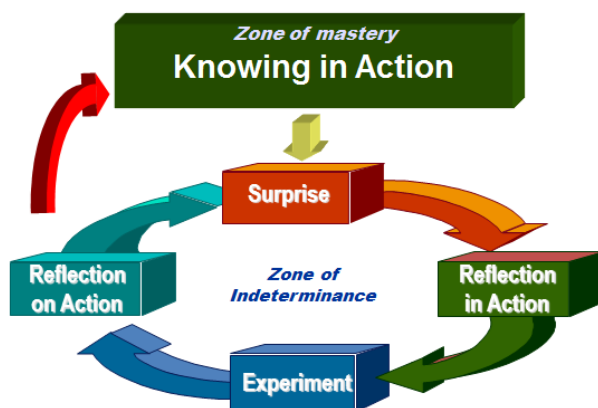


Fig 6.2-1: Schön's process of reflective learning illustrates the two opportunities of reflection in the clinicians practice that can lead him to the zone of mastery.

6.3 Building reflection into learning activities

How can educators aid clinicians to improve their reflection ability in practice? According to Campbell and Gondocz, the key is to „enhance their question asking skills“ [6]. Proficiency in reflecting on the practice setting, drawing insights from that reflection, and applying the insights to improve practice, increases the value of the reflection process. The ability of clinicians to question themselves, their colleagues and patients, and other resources, improves the likelihood that the answers will inform their future clinical decision making. Understanding their own practice and competence or performance gaps, allows practitioners to recognize the learning pathways benefitting them most. It is critically important to assist physicians to „accurately reflect on their current performance and patient outcomes and by reducing inaccurate self-perceptions of their adherence to evidence-based standards“ [6].

Reflective measures that assist the self-directed, self-correcting physician in effectively learning from their practice setting and improving their performance include: using pre and post-event assessment, case studies, reflection forms, question and answer sessions, panel discussions, and quality improvement data as well as blending traditional with new educational technologies, categorizing patient problems, and level of desired performance. Creating and maintaining learning portfolios can also assist clinicians in fine tuning their learning gaps and outcomes and in identifying future learning needs [7].



*By three methods we may LEARN wisdom: First, by **reflection**, which is noblest; Second, by **imitation**, which is easiest; and third by **experience**, which is the bitterest.*

Confucius

Fig 6.3-1:

6.4 Practical implications

In order for your educational event to promote reflection, you should:

- Provide opportunities during the learning experience to reflect on the teaching content and how to incorporate it into practice.
- Encourage learners to question their own practice, colleagues, and patients.
- Motivate learners to commit to change and improving their clinical outcomes.
- Promote feedback in a way that leads to effective reflection.

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7. Leads to verifiable outcomes

7.1 Verifiable vs measurable outcomes

In spite of the value of measurable objectives, we often refer to verifiable objectives as an appropriate target that is both useful and practical. The distinction is almost one of words rather than importance. Measurable objectives are ideal since they offer the possibility to strive for the highest outcome level, and therefore, precision. Measurement is the act of assigning numbers to variables in order to represent differences. There are four levels of measurement, in ascending order of precision: nominal (eg, yes/no, male/female), ordinal (rankings), interval (temperature) and ratio (eg, weight, distance). Scientific measurement requires a very high level of precision and therefore ratio measurements are preferred to nominal measurements. Verifiable objectives are also measurable but only at the lowest level, ie, nominal measurements. In clinical practice follow-ups are commonly employed to verify an outcome in a practical manner as opposed to attempting to measure the outcome as precisely as possible. This is the most widely used approach because the time and energy for obtaining the highest level of measurement is often not necessary to ensure the outcomes are clinically effective. The AO provides a variety of teaching experiences and all of them require some kind of assessment. When using verifiable outcomes the assessment can be practical to assure that needs are considered and an outcome is achieved. Trying to use measurable outcomes would render measurement impractical in terms of time, energy, and cost.

7.2 Continuous assessment

In the long history of continuing medical education (CME), the primary outcomes that have been used to plan these learning experiences for practicing physicians were: number of participants, revenue generated, and happiness of the learners [1]. More recently, planners have started to employ one additional measure: the degree to which learning occurred. In recent years, there has been increasing scrutiny on the CME venture. CME providers have to answer questions like "Who provides the financial support?", "What is driving the content in these meetings?", "How influential is the pharmaceutical and device industry in their influence of the purpose and outcomes?" "How much does this venture cost the health care industry and is it worth the money?"

Precious little data on the impact of these activities individually or in their totality on physician competence or performance, let alone patient care outcomes has been gathered. In order to transform this CME reality, a new model of continuous professional development (CPD) has

emerged that focuses on linking learning activities to problems identified in the health care landscape and using physicians' (or clinician teams') competence, performance, or patient outcomes as the standard for measuring learning outcomes [2]. In order to accomplish this educational transformation, CME activities need to be designed to solve physician performance gaps and/or patient outcome deficiencies [3]. The planning process for these activities needs to incorporate continuous assessment and backwards planning (planning considering the final result) [4].

As shown in the Figure 7.2-1 below, there are now multiple levels of outcomes that can be used to design learning activities targeted at improving patient outcomes. In the past, CME focused only on levels 1–3, participation, satisfaction, and lower level learning. More recently, the focus shifted to higher level learning outcomes leading to physician competence, level 4. Now CME planners need to focus their efforts on not only level 4, but also, to performance in the practice setting (level 5) and when possible, patient health outcomes (level 6) or community health outcomes (level 7). Of course, the higher the outcome level, the more difficult the task of obtaining valid and reliable data becomes for planners, chairpersons, or faculty.



Fig. 7.2-1: The different levels of outcomes that can be measured to determine the success of an educational event.

Planners design activities based on practice data or community health settings. Thus, determining desirable learning outcomes (or instructional objectives) and using the data (measured before and after the event) to understand the impact on performance or patient outcomes is preferable. “Developing approaches to assessing outcomes is not enough by

itself; strategies for planning the outcomes to be measured must be integrated with strategies for assessing them“ [4]. There are two types of evaluation available for chairpersons and faculty—formative and summative. Formative evaluation is accomplished during an activity to determine whether learning objectives are met. Summative evaluation considers the accomplishment of learning objectives as well as other factors, such as, how well the faculty accomplished their teaching roles, how the setting facilitated or hindered learning, the existence of any commercial bias, the likelihood of knowledge being transferred to the practice setting, and how effective the different formats were in accomplishing specific objectives.

Evaluation methods are selected based on the requirements necessary for accomplishing the objective of understanding the activity's impact, the design's effect and suggestions for improvement. As a chairperson or event planner it is important to keep the instruments' purpose in mind to avoid over using of evaluation and ensure that the collected data is used by future planning committees. It is preferable to mix and match evaluation methods to enhance their positive impact on the learning process. Include the use of technology, questionnaires, focus groups, external evaluators, pre and post-event assessments, or case studies for cognitive gain or assessment of competence. If a clinician's change in practice performance is a primary outcome to be studied, consider using multiple measures at various times such as a 'commitment to change' at the time of the learning activity [5, 6]. This methodology is used to both reinforce planned change and to determine the extent of change occurring within the learning event. Clinician learners are asked to indicate the content areas of the learning intervention that have led them to make a commitment to improve their practice. There is also a follow-up portion that asks the learner whether such a change was made and if not, why. Studies have shown that „multiple factors are necessary in initiating and maintaining change“ [7].

7.3 Backward Planning

The most important process to assure that verifiable outcomes are successfully reached in the planning of AO courses is to start with the "end in mind". This backward planning process was suggested by Moore, Green, and Gallis [4]. This process starts with analyzing needs in regard to the community health or physician performance issue that can be resolved through education and learning interventions. This process was recently described by Ruggiero, et al in a white paper on coordinated learning to improve evidence-based care. The process primarily assesses “how educational activities close clinical and performance gaps for individual clinicians in a stepwise, unidirectional fashion across distinct levels of outcomes” [8]. An educational planning process that starts with these assumptions before deciding on

content, formats, and faculty has a much greater chance of leading to improved patient outcomes. The competencies and objectives generated through these processes are targeted at directly impacting corresponding clinical performances that result in improved patient health. This method defines the intended educational outcomes that will form the foundation of any planned educational initiatives.

The "backward planning" process as used in the AO follows five steps:

1. Define the target audience considering who addresses the patient problems related to this clinical area.
2. Identify practice gaps or list the patient problems that the target audience is confronted with.
3. Describe the performance that these problems demand of the surgeon—what does the physician do in order to address the problems listed in step 2?
4. Define the competencies that will close the performance gap.
5. Identify the objectives by deconstructing each competence into the exact knowledge, skills, or attitudes necessary to achieve the competence.

7.4 Practical implications

In order to ensure that your educational event leads to verifiable outcomes you should:

- Consider different outcome measurement levels for different learners and activities, for example:
 - o Use case studies to measure changes in competence.
 - o Use pre and post-event assessments to measure learning.
 - o Use other data sources (registries) to measure changes in performance.
- Use desired outcomes to create learning objectives, select faculty, and content.
- Start every planning session with a serious discussion of the desired end products of the learning experience, focusing on obtaining agreement as to the target community health or patient outcomes and surgeon performance competencies that will form the basis of the activity's learning objectives.

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