Training Physicians in Practice

A report by ImplementHIT

ImplementHIT

Introduction

In order to create medical training that really works, it is essential to have a profound understanding of four related factors:

- classic models of cognition and adult learning,
- current trends and issues in the medical field (the widespread problem),
- powerful models of instructional design, and
- the pros and cons of traditional solutions.

In today's world of information overload, overworked medical practitioners, and increasing demands for compliance and reporting, all of these factors point to an optimal approach to medical training.

As technology continues to explode, and the demand for physicians' time and energy increases, medical training must take into account all of these factors and limitations and take advantage of the most powerful media. In the foreseeable future, the most effective format for ongoing medical training will be web-based training, blended with tools that leverage data to target and personalize training, and place them all at physicians' fingertips.

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Classical Models of Cognition and Adult Learning

The following sections briefly explain some classic models of cognition and instruction as well as constraints of the human brain that affect adults' ability to learn.

Bloom's Cognitive, Affective, and Psychomotor Domains

Benjamin Bloom and his colleagues developed taxonomies of educational objectives for instruction and learning identifying three separate domains: cognitive, affective, and psychomotor.

The cognitive domain included six levels:

6	Evaluation: judging the effectiveness of the value, effectiveness, or worth of the information
5	Synthesis: developing a plan or proposed set of operations which the student has not seen before
4	Analysis: identifying characteristics, elements, or interrelationships
3	Application: applying procedural knowledge in concrete situations
2	Comprehension: displaying understanding of the information by paraphrasing, explaining, or summarizing
1	Knowledge: remembering or recalling information in the form presented or learned

During the 1990s Lorin Anderson (a former student of Bloom's) led a new assembly of cognitive psychologists, curriculum theorists, instructional researchers, and testing/ assessment specialists which updated the taxonomy, hoping to add relevance for 21st century students and teachers. After six years, they developed a Revised Bloom's Taxonomy (RBT) with seemingly minor but quite significant changes to the terminology, structure, and emphasis.[F1] The new version reversed the fifth and sixth levels, and converted the noun labels to gerunds (progressive verbs): (remembering, understanding, applying, analyzing, evaluating, and creating).[O1]

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The affective domain included attitudes, appreciations, values, and emotions.[M3] Krathwol et al. organized the affective domain into five levels with each level divided into sub-levels:[K5]

1	Receiving: allowing an attitude or value to be spoken or advocated in one's presence
2	Responding: complying with the attitude, belief, or value
3	Valuing: becoming committed to and trying to convince others of the worth of the belief
4	Organization: making that belief consistent with other beliefs and one's set of values
5	Characterization: acting according to that consistent set of values[W2]

The psychomotor domain[B2] included the skills requiring the use and coordination of the skeletal muscles as well as the physical activities of performing, manipulating, and constructing[M3] At the heart of the psychomotor domain were skilled techniques used to solve problems or perform physical tasks. In learning such techniques, individuals must first perceive the problem, get ready to act on it, use skilled movements or patterns of movements, and finally learn to be innovative in ways that are acceptable to the profession or society.[W2]

No taxonomy of the psychomotor domain was universally accepted.[M3] Heinich, Molenda, and Russell's taxonomy, based on the degree of coordination applicable to many design projects, had four sequential levels: imitation, manipulation, precision, and articulation.[H2] Kibler's nonsequential groupings separated skills using different sets of muscles: gross body movements, finely coordinated body movements, nonverbal communication, and speech behavior.[K4]

Within each domain there are several levels of objectives of learning and performance, each of which is a prerequisite to the next higher level, and each main level is further divided into orderly sublevels.[W2] These can be represented as three separate domains or circles.

Although this model of three separate domains is easy to grasp, their relationship seems to be much more complex. Gagné described attitudes as having cognitive, affective, and behavioral components which interact.[S5] Morrison et al. stated:

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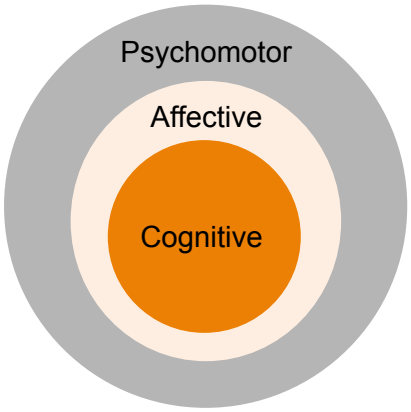
Even though we are examining three domains separately, they are closely related in two ways. First, a single major objective can involve learning in two or even all three domains…. Second, attitudinal development may even precede successful learning in the other domains. Learners often need to be motivated to learn subject matter before instruction is successful…. This step may be particularly true in a self-paced learning or distance education program, since these students must take responsibility for their own learning, and both receptiveness and cooperation can determine their level of achievement. Once motivation is established, a well-organized program in which the learners participate successfully usually encourages them to have a positive attitude toward the subject and instructor.[M3]

According to Smith and Ragan, the traditional separability of the cognitive, affective, and psychomotor domains was very much under question, and for good reason. Any cognitive or psychomotor objective has some affective component to it (if at no deeper level than a willingness to sufficiently interact with learning resources to achieve the learning). Relationships between the three domains work the other way as well; so-called affective objectives have important cognitive components, and so forth. They argued that, for purposes of clarity, it is appropriate to work specifically on learning and instruction in what is called the affective domain, knowing full well that a strict division or separation in instructional practice is not intended. Rather than view the domains as completely separate, practitioners should strive to integrate them as they design instruction.[S5]

These observations suggested some type of integrated relationship among Bloom's cognitive, affective, and psychomotor domains. In response to these critiques, Kerr[K3] proposed that they are not separate domains but nested domains which are best represented as concentric circles.

This model of nested domains suggests that the cognitive domain (the brain) is the inner core which drives the human information processing functions; the affective domain (the mind and heart) is the inner layer which filters both perceptions coming into the brain and attitudes leaving the brain; and the psychomotor domain (the physical body) is the outer layer which both senses physical stimuli and manifests the actions or reactions of the heart and brain.



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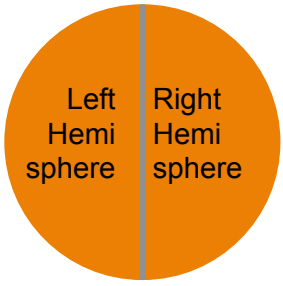
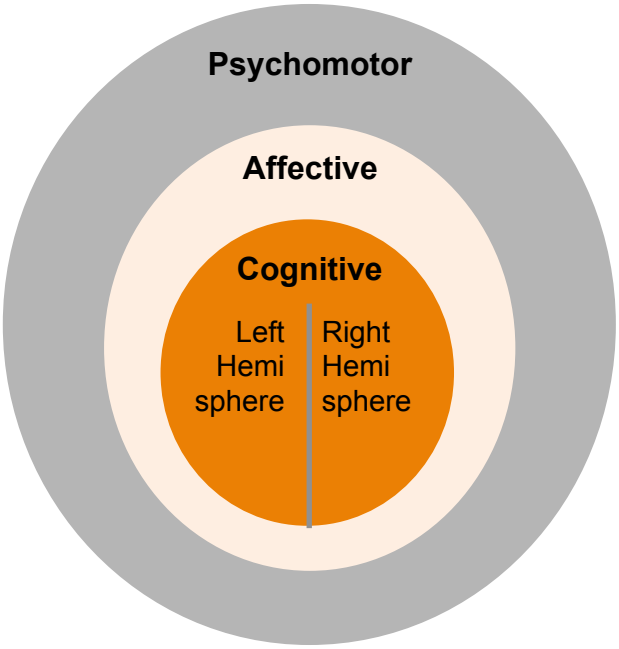
Sperry's Left-Brain, Right-Brain Dichotomy

In 1981, Roger Sperry received the Nobel Prize for Physiology or Medicine as a result of his discoveries concerning the functional specialization of the cerebral hemispheres.[C6] Sperry's studies demonstrated that the left and right hemispheres of the brain are specialized in different tasks. The left hemisphere is normally specialized in taking care of the analytical and verbal tasks, while the right hemisphere can only produce rudimentary words and phrases but contributes emotional context to language. The left side speaks much better than the right side, while the right half takes care of the space perception tasks (such as making a map or giving directions) and music.[N1] This division of the hemispheres into verbal and linguistic left and visual-spatial right has become a basic model of brain functioning.[C6]



Assuming that Sperry's classic model of the brain hemispheres corresponds to Bloom's cognitive domain, these two models may be integrated into a single model.



Gardner's Theory of Multiple Intelligences

Another essential cognitive model is Gardner's theory of Multiple intelligences (MI). Gardner stated that he had two purposes: First, there was pervasive evidence for the existence of several relatively autonomous human intellectual competencies—what he called frames of mind or human intelligences—although he had not established the precise number or exact nature and breadth of each frame. Second, at least some of these intelligences are independent of each other and can be fashioned and combined in a multiplicity of adaptive ways by individuals and cultures.

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Gardner believed that previous attempts to establish independent intelligences had failed chiefly because they relied on only one or two lines of evidence, on the basis of logical analysis, the history of educational disciplines, and intelligence testing, or insights obtained from brain study. The IQ test considered only two or three different facets of intelligence, when there are at least seven types of intelligence:[G1]

Linguistic	Logical-Mathematical	Musical	Spatial	Intrapersonal	Interpersonal	Bodily-Kinesthetic

Gardner succinctly defined each of the seven intelligences. The first two intelligences—linguistic and logical-mathematical—are the ones that have typically been valued in school. *Linguistic* intelligence involves sensitivity to spoken and written language, the ability to learn languages, and the capacity to use language to accomplish certain goals. Linguistic intelligence is the competence most widely shared across the human species. The core operations of language include a sensitivity to the order, sounds, rhythms, inflections, and meters of words, as well as the functions of language and its potential to excite, stimulate, convey information, or simply to please.[G3] Linguistic knowledge has four aspects of striking importance in human society: first, rhetoric (the ability to use language to convince other individuals of a course of action); second, mnemonic potential (the capacity to help one remember information); third, explanation (the ability to teach and learn facts, concepts, skills, processes, and procedures); and fourth, metalinguistic analysis (its potential to explain its own activities).[G1] *Logical-mathematical* intelligence involves the capacity to analyze problems logically, carry out mathematical operations, and investigate issues scientifically.[G3]

Gardner mentioned linguistic and logical-mathematical intelligence first, not because they are most important, but because they are the most prized in our society. He was convinced that all seven intelligences have equal priority.[G2] Moreover, the fact that most psychologists and other academics exhibit a reasonable amalgam of linguistic and logical intelligence made it almost inevitable that those faculties would dominate tests of intelligence.[G3]

According to Gardner, three intelligences are particularly notable in the arts, though each can be put to other uses.

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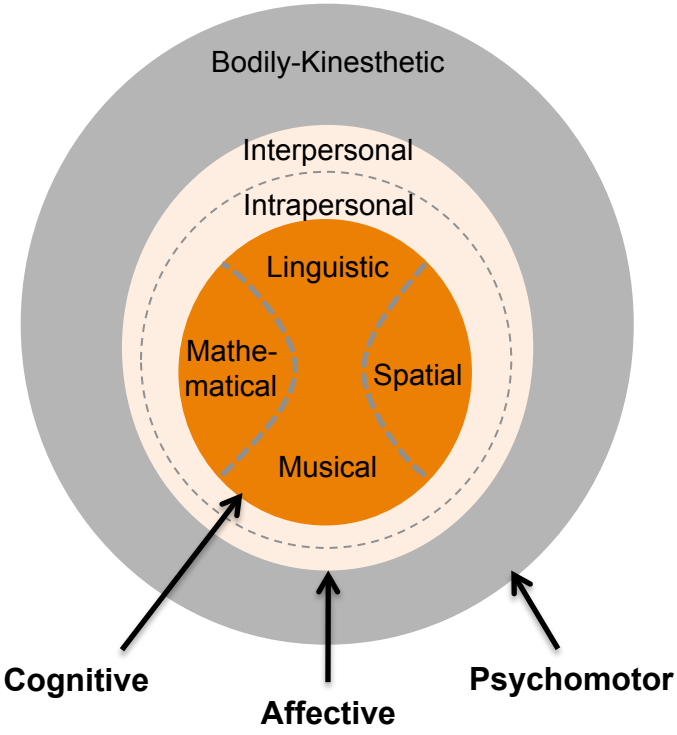
Bodily-kinesthetic intelligence entails the potential of using one's whole body or parts of the body (like the hands or mouth) to solve problems or to fashion products. Gardner acknowledged that, in the original list, the two personal intelligences are less clear-cut. Intrapersonal intelligence involves the capacity to understand oneself, to have an effective working model of oneself (including one's own desires, fears, and capacities) and to use such information effectively in regulating one's own life. Interpersonal intelligence denotes a person's capacity to understand the intentions, motivations, and desires of other people and to work effectively with others.[G2]

Gardner initially stressed the origins of intrapersonal intelligence in a person's emotional life and its strong alliance with affective factors but later changed his perspective. Rather than restricting emotions to one or two personal intelligences, he stressed the vital role of intrapersonal intelligence in a person's life-course decisions and considered emotional facets of each intelligence.[G3] Gardner was quick to acknowledge that this list of intelligences was a preliminary list. The list could be rearranged, and each form of intelligence could be subdivided. The real point was the plurality of intellect.[G1]

The Domain-Intelligence Model

Considering the foregoing observations about the inter-relationships of the seven multiple intelligences, as well as the underspecification or localization of left- and right-brain functions related to language and music, Kerr[K3] integrated Bloom's taxonomies of the cognitive, affective, and psychomotor domains as concentric circles, Sperry's split-brain model (in the cognitive domain), and Gardner's original seven multiple intelligences into the Domain-Intelligence model. The seven intelligences may be mapped roughly to the integrated cognitive, affective, and psychomotor domains and the left- and right-brain dichotomy.



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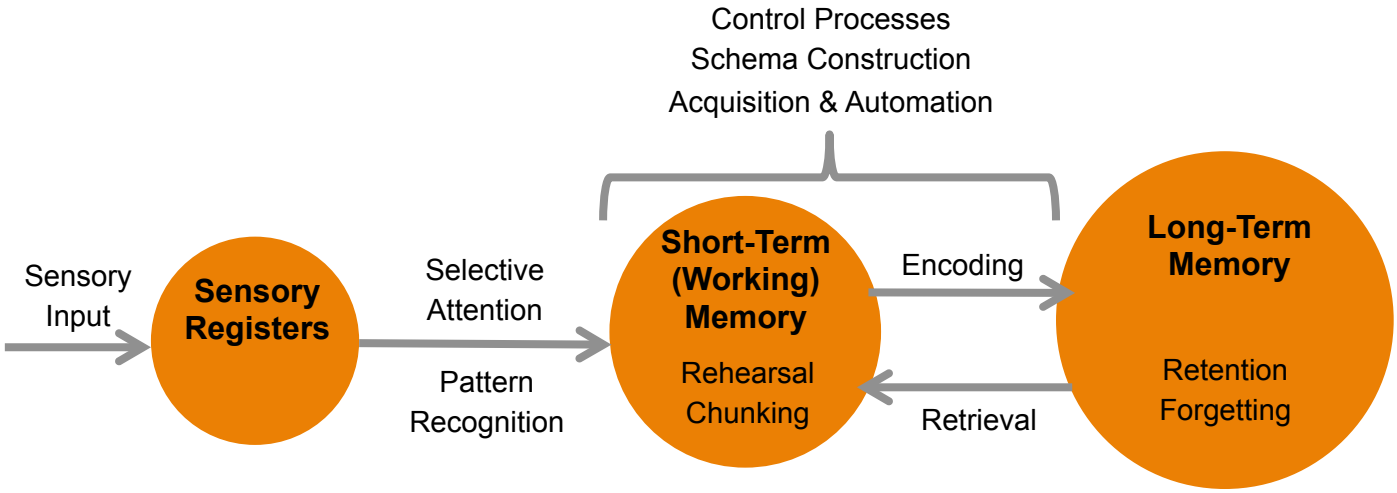
This model suggests that logical-mathematical intelligence is predominantly left-brained, whereas spatial intelligence is predominantly right-brained. It takes into account Gardner's[G1, G2, G3] localization of language as predominantly left-brained, with essential right-brained capacities, as well as his less-definitive localization of music as predominantly right-brained with a plurality of left-brained mechanisms. It supports Poeppel and Hickok's[P6] bilateral characterization of language and music. It also supports Patel's[P3, P4] observation that there are deep connections in terms of cognitive and neural processing; in both domains the mind interacts with one particular aspect of sound (timbre in speech and pitch in music).



Human Information Processing

As first conceived by Atkinson and Shiffrin[A4], the information flow through the memory system begins with the processing of environmental inputs in sensory registers and entry into the short-term store (STS) or temporary working memory (WM). While it remains there, the information may be copied into the long-term store (LTS) or permanent memory store, and associated information already in the long-term store may be activated and retrieved into the short-term store. Control processes in the short-term store affect transfers into and out of the long-term store and govern learning, retrieval of information, and forgetting.

Sensory Registers. In the first stage the sensory registers receive environmental inputs through the senses. Each sense (vision, hearing, touch, smell, and taste) has its own

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register which holds information for only a fraction of a second, but several senses can be engaged simultaneously and independently. Some sensory input is transferred to working memory for further processing while other input is erased and replaced by new input.[S2]

Miller reviewed a number of previous experiments testing how accurately people can assign numbers to the magnitudes of various aspects of a stimulus to ascertain the channel capacity of the different senses. The general limitation of humans' span of absolute judgment (which is constant) and span of immediate memory (which is variable) are both approximately 7 ± 2 items.[M2] Once the human cognitive system exceeds this limit, the thinking and learning processes begin to bog down.[C5]

Two activities that heavily influence the effectiveness of sensory memory are: selective attention and pattern recognition. Selective attention is the learner's ability to select and process certain information while simultaneously ignoring other information, which depends upon several main factors: (a) the meaning that the task or information holds for an individual, such as his or her name; (b) the similarity between competing tasks of sources of information, such as two simultaneous conversations; (c) the complexity or difficulty of the task; and (d) the learner's prior knowledge about the information. One's ability to control attention may also differ according to his or her (e) age, (f) hyperactivity, (g) intelligence, and (h) learning disabilities. Pattern recognition is the process of recognizing environmental stimuli as examples of concepts or principles by matching them to templates, prototypes, distinctive features or past experience.[D1]

Short-Term Memory (STM) or Working Memory (WM). The second stage of cognitive information processing, working memory (WM) or short-term memory (STM), has been likened to awareness, or what one is conscious of at any given moment. Working memory is limited, not only in duration, but also in capacity.[S2] However, humans have a variety of techniques for getting around it and increasing the accuracy of their judgments. The three most important devices are: making relative rather than absolute judgments, increasing the number of dimensions along which stimuli can differ, and arranging a task to make a sequence of several absolute judgments in a row.[M2]

Working memory stores chunks of data in a series of (approximately seven) slots. As new chunks come into memory, they push out those previously occupying the available spaces. Chunking is increasing the capacity of working memory by creating larger bits.[D1]

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As Miller explained the process of recoding, "since the memory span is a fixed number of chunks, we can increase the number of bits of information that it contains simply by building larger and larger chunks, each chunk containing more information than before." [M2] Given individual differences, unrefreshed information will typically be lost from working memory in about 15 to 30 seconds. Preventing the decay of information may require two processes: rehearsal and encoding. One example of rehearsal (or maintenance rehearsal) as a person repeating a phone number until he or she can use the phone. Once he or she is connected, there is no need to maintain that number in working memory. Rehearsal is not enough to prepare information to reach a relatively permanent state in long-term memory. For arithmetic facts, spelling words, or a memorized script, simple repetition may be effective, but for more complex and meaningful information, repetition will not ensure its being fully processed in long-term memory; encoding will.[D1]

Long-Term Memory (LTM). The third stage of cognitive information processing is long-term memory (LTM). It is the permanent repository of the lifetime of memory traces that human beings have accumulated, which allows them to recognize familiar people and objects and perform meaningful tasks such as brushing their teeth or driving a car.[B5] Long-term memory is capable of retaining an unlimited amount and variety of information.[D1]

Bruning et al. highlighted four facets of long-term memory: explicit vs. implicit; declarative, procedural, and conditional knowledge; semantic vs. episodic memory; and building blocks of memory.

Explicit memory involves voluntarily recalling or consciously searching for information, whereas implicit memory occurs when a person unintentionally recalls a past experience or a thought pops into his or her head.[B5]

Declarative knowledge (or knowing what) refers to facts, subjective beliefs, scripts (such as events in a story), and organized passages (such as the Gettysburg Address) and may be stored in declarative memory quickly.[S2]

Procedural knowledge (or knowing how) consists of concepts, rules, and algorithms. Because it involves acquiring physical skills (such as riding a bicycle or driving a car), developing processes (such as balancing a budget), and learning complex relationships (such as conjugating Latin verbs), acquiring procedural knowledge may require a great deal of time and extensive practice to be stored in procedural memory, yet be difficult to describe.[D1, S2]

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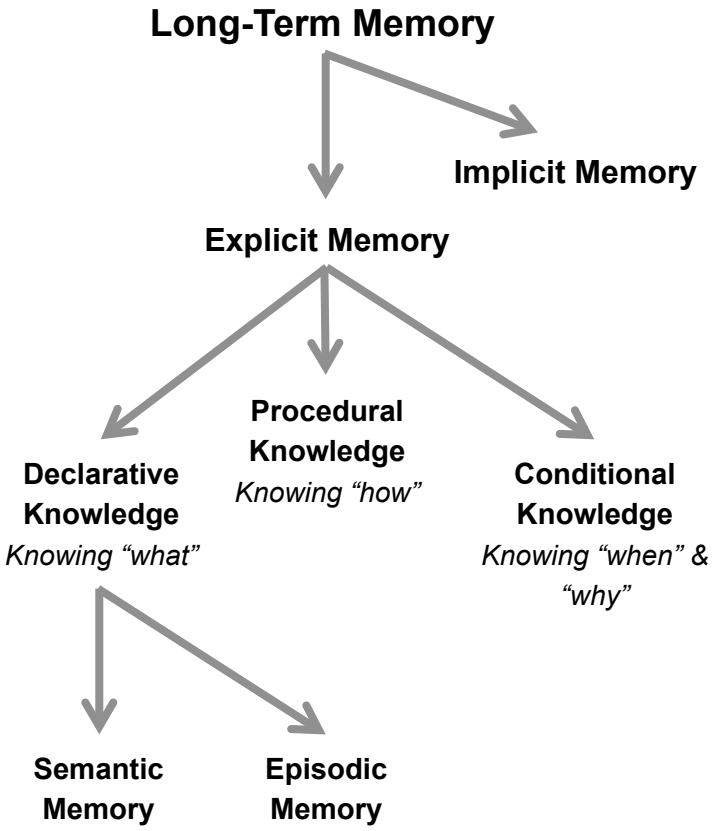

Conditional knowledge is knowing when and why to use declarative and procedural knowledge. Most learning involves interplay among declarative, procedural, and conditional knowledge.[B5]

Within the category of declarative knowledge, Tulving[T4] further distinguished between semantic memory and episodic memory. Semantic memory includes general information and concepts (such as the meaning of words, geographical locations, and chemical formulas) and their associations which can be recalled independently of the context in which they were learned.[B5, D1]

Episodic memory includes information associated with specific events that is personal and autobiographical.[S2]

The most critical process of cognitive information processing is the transfer of information from working memory into long-term memory.[S5]

Encoding. Encoding (or elaborative rehearsal) is making new information meaningful, integrating it with known information, and preparing it for storage in long-term memory.[S1] Common encoding techniques are categories, outlines, mnemonics, hierarchies, stories, imagery, and stories.[D1] Important factors that influence encoding are organization, elaboration, and schema structures. It is much easier to learn and recall well-organized material because items are linked to one another systematically, and recall of one item prompts recall of all items linked to it. Elaboration is the process of expanding upon new information by adding to it or linking it to what one knows.[S1] Encoding is making new information meaningful, integrating it with known information, and preparing it for storage in long-term memory. Important factors that influence encoding are

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Schema Construction

Schema theory postulated that our existing knowledge is comprised of schemata (or schemas)—collections of highly organized information and their relationships (such as home, school, or restaurant) and all the things, people, and activities that occur there.[A1]

Activation is an array of activities designed to activate relevant knowledge prior to encountering new information.[B5] Learning is a continuum, from accretion, through tuning, to restructuring.

Accretion is gradually adding facts, details, and concepts to an existing schema that is adequate to store the new information.

Tuning involves modifying (or fine tuning) an existing schema to accommodate the new information.

If the new information is quite discrepant with the existing information, learning requires restructuring the existing schema.[W2]

Acquisition and Automation

Schema theory involves more than accretion (building a new schema), tuning (modifying an existing schema), and restructuring (extensively remodeling an existing schema to incorporate new information).[B5] Intellectual mastery of any subject is overwhelmingly dependent on two critical learning mechanisms: schema acquisition (constructing larger and larger schemata) and automation (the transfer of learned procedures from controlled to automatic processing).[S7]

Skilled performance develops through acquisition—combining elements into schemas, then lower-level schemas into higher-level schemas, and building increasing numbers of ever more complex schemas.[S5] Automation affects everything learned, including schemas themselves. When a learner first acquires a complex intellectual skill, it may be usable only by devoting considerable cognitive effort. Without automation, performance is likely to be slow, clumsy, and prone to error; with time and practice, performance may become automatic to the point where it requires minimal thought. Only then can intellectual performance attain its full potential.[S7]

Both schema acquisition and automation substantially reduce the load on working memory. By chunking individual elements into a single element, schemas effectively increase the

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amount of information that can be held in working memory, which ameliorates its limitations. Likewise, automation requires less space in working memory, thus freeing capacity for other functions, and may even bypass working memory, thus circumventing its limited processing capacity.[S7] Because of schema construction, although there are limits on the number of elements that can be processed by working memory, there are no apparent limits on the amount of information that can be processed. A schema, consisting of a single element in working memory, has no limits on its informational complexity.[S9]

Note: In the case of a new paradigm or symbol system, it may be necessary to unlearn what one has already learned (i.e., discard existing schemata) in order to integrate a more correct or effective mental model.

Activating Prior Knowledge. Prior knowledge plays an enormous role in both building schema and meaningful learning. To a great extent, what learners bring to the learning situation dictates what they will take away from it in terms of new knowledge. However, possessing relevant prior knowledge is no guarantee that learners will activate and use it appropriately. All too often, learners approach learning in much the same way, regardless if they have prior knowledge to apply to the task. To assure that meaningful learning takes place, instructors and designers can employ a variety of strategies (such as advance organizers and schema signals) to help learners relate their prior knowledge to new information.[D1]

Retrieval. Once information (in any form) has been stored in long-term memory, it can be retained over time, retrieved for use, or forgotten.[D1] Just as organization, elaboration, and schema construction enhance storage of information in long-term memory, they enhance retrieval of information.[S2]

Ebbinghaus: Learning, Forgetting, and Relearning

Herman Ebbinghaus (1850-1909) was a pioneer in bringing higher mental processes into the experimental laboratory and thus helped establish psychology as a science.[S2] His research laid the groundwork for our understanding of memory, including the learning curve, the forgetting curve, and the spacing effect.[I1]

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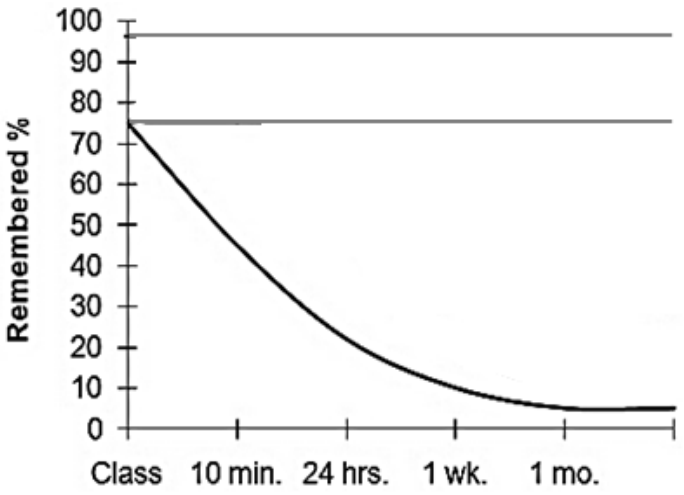
Learning. Ebbinghaus presumed that, if ideas are connected by the frequency of their associations, then learning and recall should be predictable based on the number of times a given association is repeated.[D1, S2] Because Ebbinghaus wanted to investigate the learning of new associations, untainted by past experience, he constructed a pool of 2,300 nonsense syllables—consonant-vowel-consonant trigrams (such as qap, jor, mol, kuw) which were inherently meaningless—and presented sequences of 16 syllables to himself.[D1] In a typical experiment, Ebbinghaus would devise a list of nonsense syllables, look at each briefly, pause, and then look at the next syllable. In this manner, he determined how many trials it took to learn the entire list.[S2]

By systematically varying such factors as the number of syllables in the list, the number of lists studied, and the amount of time spent studying each list, Ebbinghaus provided experimental verification of some obvious facts about memory. For instance, the more material there is to learn, the longer learning takes. The longer it has been since something has been learned, the harder it is to remember.[D1] He also memorized some meaningful passages and found that meaningfulness made learning easier.[S2]

It is important to note that learning is not always a rational process (cold cognition); it often entails emotion (hot cognition). Because humans attach beliefs, values, and attitudes to their knowledge, these affective or motivational variables sometimes create resistance to change and to learning new structures.[W2]

Forgetting. Ebbinghaus first practiced a list of nonsense syllables until he obtained one error-free recitation. Then, after varying delays, he would relearn the materials to the same criterion[B5] noting how much he remembered and forgot.[M1] Ebbinghaus established the now-classic forgetting curve, which shows that forgetting proceeds very rapidly at first and then more slowly as the time from the learning increases.[D1] For example, he determined that the adult brain will lose up to 75% of all information taught within 1 week.[I1]



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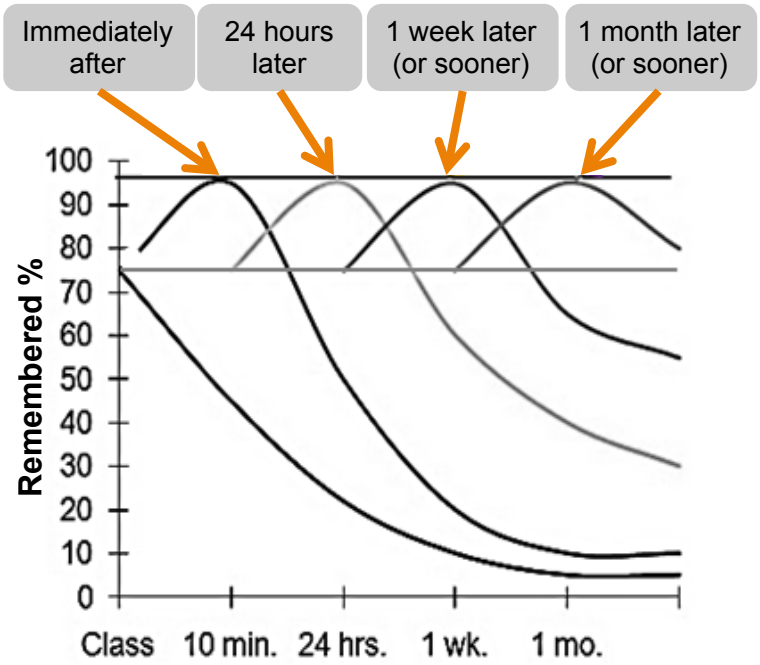
Reactivation and Retention. Ebbinghaus demonstrated that review at specific intervals (10 minutes, 1 day, 1 week, and 1 month) enables adult learners to effectively retain new concepts in long-term memory. Repeated exposure at these four intervals staves off memory degradation. In other words, Reactivation = Retention.[I1]



Relearning. The most sensitive measure of memory is not recall, recognition, or the ability to reconstruct events. It is the memory savings that people experience when relearning information. Ebbinghaus also studied how easy it was to relearn forgotten information.[M1] By comparing the number of trails he needed in the first and second learning sessions, Ebbinghaus determined the level of memory savings. Even when recognition or recall was not possible, if fewer trials were required on the second session than on the first session, the existence of any savings indicated that some parts of the information had been remembered.[B5] Ebbinghaus calculated the savings score—the time or trials necessary for relearning—as a percentage of the time or trials required for original learning.[S2]

The tradition of memory research begun by Ebbinghaus dominated the study of memory for nearly a century.[M1] The principle of association remains a driving force within many modern conceptions of learning.[D1]

Hemispheric Preference

An extremely important extension of Sperry's left-brain, right-brain dichotomy and human information processing is hemispheric preference. While developing the Human Information Processing Survey (HIPS), Torrance, Taggart, and Taggart[T3] defined and described four processing strategies and tactics:

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A left dominant information processor strongly prefers to deal with problems in an active, verbal, and logical manner; he will only use the intuitive strategy when absolutely necessary. This person is task-oriented. He prefers a well-defined central organization with realistic economic goals; a concern for factual details in decision-making; a high priority on clear assignments; an emphasis on the work to be accomplished; and established guidelines and procedures for performance. Typically, in the left-dominant tactic, a person generally conforms to accepted ways and works through the process with an eye toward the improvement of existing capabilities.[T3]

In contrast, a right dominant information processor strongly prefers to deal with problems in a receptive, spatial, and intuitive manner; he or she will only use the logical strategy when absolutely necessary. This person is people-oriented. He or she prefers a diffuse, decentralized organization with loose lines of authority; idealistic humanistic goals; a concern for broad overall issues; a high priority on self-initiative; and flexible rules for behavior and performance. In the right-dominant tactic, a person does not conform to accepted ways and moves through the process with an eye toward the invention of something new.[T3]

A mixed information processor tends to shift between a left-dominant or right-dominant strategy depending on the situation.[T3] When approaching a problem, this person typically looks at left-dominant and right-dominant elements in isolation, not in terms of their relationship to one another.[T1]

An integrated information processor operates simultaneously in the left and right modes without a clear preference for either. The integrated strategy combines both left and right strategies in appropriate proportions. Choosing the integrated tactic indicates that a person is already comfortable using the whole-brain response in problem solving.[T3]

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Keller's ARCS Model of Motivation

Clearly, attitudes can serve as motivating forces, and (to some extent) motivating learners is a matter of attempting to instill certain attitudes in them.[D1]

Keller's ARCS Model of Motivation[K1] indicated four design considerations for creating motivating instruction. The designer must not only capture attention early in the lesson but maintain attention throughout the lesson. Relevance means showing learners that what they are learning will be important and useful to them.

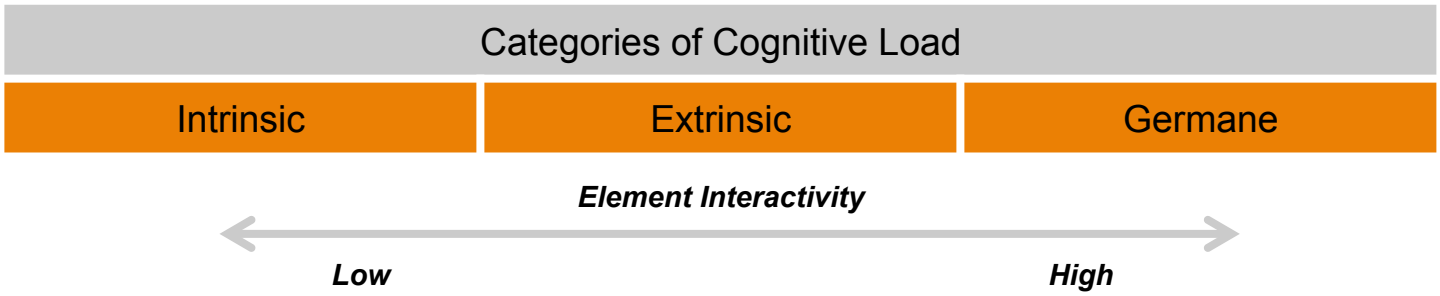
A	Attention
R	Relevance
C	Competence
S	Satisfaction

Keller identified four practices that increase confidence: (a) making expectations clear to the learner, (b) providing reasonable opportunities for the learner to be successful, (c) providing learners with a reasonable degree of control over their own learning, and (d) helping learners to recognize that learning is a direct consequence of their own efforts and effective learning strategies.

Keller also identified several activities that increase satisfaction by enabling learners to apply what they have learned: (a) providing positive consequences following progress, (b) giving encouragement during times of difficulty, and (c) being fair. The designer can achieve fairness through lesson consistency, activities that align to the stated objectives, and intelligent and consistent evaluation of learner actions.

Keller's[K1] recommendations regarding building confidence are similar to Vygotsky's[V1] concept of the zone of proximal development (ZPD)—the difference between the difficulty level of a problem that a [novice] can cope with independently and the level that can be accomplished with [expert] adult help. In the zone of proximal development, a novice and expert work together on problems that the novice alone could not work on successfully[D1]. In turn, Vygotsky's theory of the zone of proximal development is closely aligned with the concept of instructional scaffolding. In instructional scaffolding a teacher provides students with selective help (such as asking questions, directing attention, or giving hints about possible strategies) to enable them to do things they could not do on their own. Then, as students become more competent, the teacher gradually withdraws the support.[B5]

Classical Models of Cognition and Adult Learning



Cognitive Load Theory

Another line of research that has a tremendous impact on adult learning is Cognitive Load Theory (CLT). Cognitive load is the amount of work imposed on working memory (WM).[C4] Cognitive load theory incorporates the following basic principles: (a) the practical limitations of working memory, (b) balancing the three categories of cognitive load, (c) understanding the CLT effects, and (d) designing instruction to optimize learning.

Practical Limitations of Cognitive Load.
Working memory is a paradoxical resource, because it is both the bottleneck and the engine of learning. The original notion of capacity limit of 7±2 proposed by Miller[M2] has been revised to an even more restrictive limit of around four to five chunks of information when working memory is active.[C4] The number of items is closer to five.[S3] Any interactions between elements held in working memory require capacity, reducing the number of elements available. Therefore, when required to process (i.e., organize, compare, or manipulate) rather than merely hold information, humans are probably only able to deal with two or three items simultaneously.[S9]

Balancing the Three Categories of Cognitive Load.
Cognitive load theory has identified three categories of cognitive load: intrinsic, extraneous, and germane (Sweller et al., 1998).[S9]

The first type—intrinsic cognitive load—is the mental work imposed by the complexity of the content and is primarily determined by the element interactivity and instructional goals.[C5]

There is a continuum between low and high element interactivity. At one end, low element interactivity tasks allow a person to hold only a few elements in working memory at a time and process them serially. At the other end, high element interactivity tasks require a person to hold several elements in working memory at the same time and manipulate them simultaneously.[S9]

Classical Models of Cognition and Adult Learning

The second type—extraneous (or irrelevant) cognitive load—is due to instructional procedures that unnecessarily impose a heavy load on working memory, which interferes with learning.[O2, S5] Extraneous cognitive load imposes mental work that is irrelevant to the learning objectives and consequently drains limited mental resources. The results of inefficient training programs with many sources of extraneous cognitive load are longer times to learn and/or poorer learning outcomes.[C5]

The third type—germane (or relevant) cognitive load—is extra mental work imposed by instructional activities that benefit the instructional goal[S9, C5] and facilitate the construction and automation of schemas[O2] These three categories of cognitive load (intrinsic, extraneous, and germane) are additive. If learning is to occur, the total cognitive load cannot exceed the resources available in working memory. After working memory has allocated resources to deal with intrinsic cognitive load, it can allocate the remaining capacity to deal with extraneous and germane load. Likewise, using a more effective instructional design can reduce extraneous cognitive load and thus free resources in working memory for germane cognitive load.[P1]

CLT Effects. Over the last 30 years, researchers in cognitive load theory have identified various effects that contribute to cognitive load and applied various principles to leverage the processes of human cognitive learning and thus create more efficient learning environments.[C5] By simultaneously considering the structure of information and the cognitive architecture that allows learners to process that information, cognitive load theorists have been able to generate a unique variety of new and sometimes counterintuitive instructional designs and procedures.[P1] Cognitive load theory has proved successful not only because of its reliance on a particular view of human cognition but also because no instructional recommendation has been offered without first being extensively tested using controlled experiments.[S8]

Designing Instruction to Optimize Learning. Owens and Sweller stated that the aim of instruction is to reduce extraneous load so that working memory resources are available for germane cognitive load, which results in schemas being stored in long-term memory.[O2] Instructional designers must reduce extraneous cognitive load by (a) optimizing the use of visual and auditory presentation modes; (b) supporting learner attention; and (c) reducing the amount of information that must be processed in memory.[C5] The freed working memory capacity allows the learner to acquire more advanced schemas.[P1]

All of these models of cognition and learning affect all adult learners, therefore no one-size-fits-all approach to instruction can be effective for all learners, particularly in the field of medical training.

Trends and Issues in the American Health System

Introduction

To be a healthcare professional in the United States today is to feel the ground shifting under your feet. As the American healthcare system transitions into a new era, physicians' attitudes toward the medical profession are also in flux. The Physicians Foundation's 2014 Survey of America's Physicians [P5] (the third in a now-biennial series) was conducted to take the pulse of physicians and offer a "check-up" of the medical profession during this transformative period. It reflects an evolving mood among doctors that is still uncertain and sometimes dispirited.

Between 2012 and 2014 the healthcare system in the United States saw more changes than in any comparable two-year period in recent memory. The following are just a few significant examples:

- 8 million Americans have enrolled in insurance plans through the Affordable Care Act (ACA)
- An additional 5 million Americans have enrolled in Medicaid
- An unprecedented number of hospitals and medical groups have consolidated
- An explosive proliferation of urgent care centers, retail clinics, and other outpatient facilities
- The release of billing data by Medicare on thousands of physicians
- The continued rapid adoption of Electronic Medical Records (EMR)
- The implementation of quality-based tracking and reimbursement payment systems
- The continued expansion of Accountable Care Organizations (ACOs)
- A growing physician shortage
- Given the rapid pace of medical research, the amount of medical knowledge doubles every 3-5 years

No group inside or outside of healthcare may be more impacted by these changes than physicians. It is physicians who must:

- Accommodate the flood of patients newly insured through the ACA
- Adjust to inverted business models that feature large integrated health systems rather than small private practices
- Adapt to payment systems turned upside down in which value of services is rewarded instead of volume
- Implement electronic medical records and a wide array of other medical and practice management technologies required by health reform
- maintain the highest standards of care as they manage over 1.3 billion patient encounters per year.[U1]

Trends and Issues in the American Health System

The goal of the survey was to provide a snapshot of physician morale levels, practice plans, practice patterns, and professional perspectives in the year 2014 through one of the largest and most comprehensive physician surveys undertaken in the United States. Sent to over 650,000 physicians — over 80% of all doctors in active patient care— this survey provided physicians the opportunity to express their thoughts about the medical profession and the healthcare system in their own words.

Because physicians remain central to the patient experience, how they feel about their profession and how they elect to practice have significant and widespread implications for those working in, or seeking access to, the healthcare system. Policy makers, analysts, academics, healthcare facility administrators, media members, the public, and physicians themselves are encouraged to review and comment on these findings.

To access the Physicians Foundation's 2014 Survey of America's Physicians: *http://www.physiciansfoundation.org/uploads/default/2014_Physicians_Foundation_Biennial_Physician_Survey_Report.pdf*

Summary—A Changing of the Guard

Broadly speaking, though the 2014 survey[P5] presents a picture of the medical profession that has approached the edge of crisis, it also suggests that a changing of the guard may be taking place among physicians that could lead to a revised view of the profession.

Relative to the national surveys The Physicians Foundation conducted in 2012 and 2008, as their ranks change demographically and their status rapidly shifts from that of independent practice owner to employee, doctors are somewhat more positive in their outlook.

The 2014 survey also indicates a continued pressure on physicians to keep up with demand for their services, as over 80% of doctors report being overextended or at full capacity. As a response to the physician shortage, over 72% of doctors believe that additional physicians should be trained and the current cap on funding for physician graduate medical education be lifted. Conversely, many physicians plan to take steps that will reduce patient access to their services, such as retiring, working part-time, or seeking non-clinical jobs. Such steps would lead to the reduction of tens of thousands of physicians from the workforce, which would further compound the physician shortage.

Though physicians report that the majority of their patients now are enrolled in Medicare and Medicaid, some physicians no longer see patients in these two government insurance programs, or limit the number they see. While some physicians have elected to participate in new delivery models such as Accountable Care Organizations (ACOs), and while most have adopted electronic medical records (EMR), many are dubious about the benefits of these models and systems and do not believe they will achieve cost or quality gains.

Trends and Issues in the American Health System

Though one-third of physicians participate in state or federal exchanges/marketplaces established by the Affordable Care Act (ACA), close to the same number have no plans to do so. Almost half of physicians give the ACA a low to failing grade, while only one quarter give it a positive to excellent grade, though opinions of the ACA and many other topics vary among "new guard" and "old guard" physicians.

2014 Survey of America's Physicians includes a detailed discussion of these and various other trends. The following sections highlight the survey's key findings about trends in the American healthcare system, as well as responses to the survey broken out by all respondents and by various physician types.

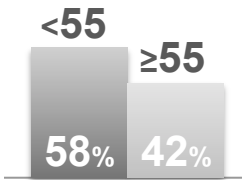
Part I	Description of Survey Respondents
Part II	Physician Morale
Part III	Practice Plans, Patterns, and Patient Access
Part IV	Health Reform and New Delivery Models
Part V	Selections from Written Comments

Trends and Issues in the American Health System

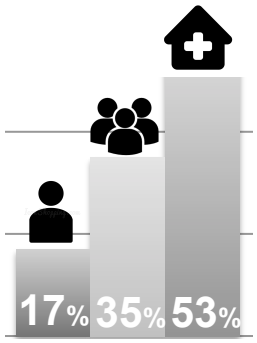
Part I: Description of Survey Respondents[P5]

In recent years, America's physicians—once a demographically homogeneous group—have become more diverse.

Physician Demographics	Like the general population, the physician population is aging. Doctors 55 and older comprise 42% of the physician workforce. Medicine will soon be faced with a wave of physician retirements as baby boom doctors begin to exit the field. The younger doctors who take their place are likely to have different attitudes toward medicine and the healthcare system as a whole. This indicates a "changing of the guard" in medicine and its implications.
Practice Settings	Practice settings have evolved away from the traditional small private office to multi-hospital systems, consolidated medical groups, integrated entities such as Accountable Care Organizations (ACOs), urgent care centers, free-standing emergency departments and surgery centers, Federally Qualified Health Centers (FQHCs), retail clinics, and a variety of others. Only 35% of physicians describe themselves as independent practice owners (down from 49% in 2012 and 62% in 2008). 53% of physicians describe themselves as hospital or medical group employees (up from 44% in 2012 and 38% in 2008). Only 17% of physicians indicate they are in solo practice (down from 25% in 2012).
Practice Models	Traditional full-time private practice is evolving to a range of practice styles, including in-patient-only practice, *concierge* (direct pay) practice, part-time practice, l*ocum tenens*, and others. **Note:** Roughly translated from Latin, *locum tenens* means "to hold a place." When a healthcare employer faces temporary staffing shortages due to vacancies, illness, or other causes, they hire locum tenens physicians (and other part-time clinicians) to fill those vacancies on a temporary basis.[S6] The *employed* model is making large inroads into private practice. Over 90% of newly-hired physicians are employed by a hospital, medical group, FQHC, academic medical center, or other entity. Less than 10% are joining an independent private practice.
Payment Models	Traditional payment models—once predominantly fee-for-service and volume-based—are moving towards models that attempt to reward performance and value. 7% of physicians now practice some form of direct pay/concierge medicine, while 13% indicate they are planning to transition in whole or in part to this type of practice. 17% of physicians 45 or younger say they will transition to direct pay/concierge practice.



42% of the physician workforce are 55 and older.



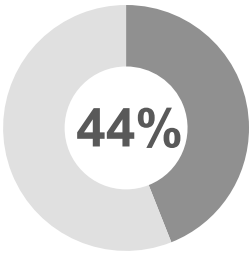
17% of physicians indicate they are in solo practice, 35% as independent practice owners, 53% as hospital or medical group employees.

Trends and Issues in the American Health System

Part II: Physician Morale[P5]

In almost all groups the majority of physicians suffers from low morale and express doubts about the direction of the healthcare system.

Feelings about the Future of the Medical Profession	44% of physicians describe their morale and their feelings about the current state of the medical profession as *positive* (an increase from 32% in 2012), however physicians are not uniform in their perspectives. The "new guard" (younger physicians, female physicians, employed physicians, and primary care physicians) are somewhat more positive about the current medical practice environment than are the "old guard" (older physicians, male physicians, practice owners, and medical specialists). Most doctors under the age of 45 entered the profession when changes to physician practice structures and reimbursement were underway. Many have always been employed and have no basis for comparing the *employed* practice model to the *independent* model.
Causes of Physician Dissatisfaction	Prominent causes of physician dissatisfaction are: high levels of government regulation, pressures imposed by potential malpractice liability, the struggle for reimbursement, the uncertainty of health reform, lack of personal time, and the erosion of clinical autonomy. 69% of physicians believe that their clinical autonomy is sometimes or often limited and their decisions compromised.
Causes of Professional Satisfaction	Physicians ranked the top sources of professional satisfaction as: patient relationships, intellectual stimulation, interaction with colleagues, financial rewards, and prestige. When the quality of patient relationships declines, either through lack of clinical autonomy, liability concerns, a continuing struggle for reimbursement, lack of patient face-time, and other factors, physicians become demoralized. Because primary care physicians typically follow patients over time, they may receive more emotional rewards from medicine than specialists, whose patient encounters are often episodic. Due to a sense of ownership and patient continuity, private practice physicians may experience more emotional rewards than do employed physicians, another reason for their relatively more positive perspectives.
Recommending Medicine as a Career	If they had their careers to do over, 29% of physicians would not choose medicine (a decrease from 35% in 2012). Only 42.3% of practice owners would recommend medicine as a career to their children, compared to 53.5% of employed physicians. Only 47.4% of specialists would recommend medicine as a career compared to 53.8% of primary care physicians.



44% of physicians describe their morale and their feelings about the current state of the medical profession as positive

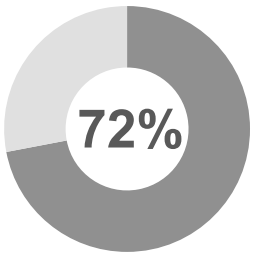
47% of specialists would recommend medicine as a career to their children compared to 53.8% of primary care physicians

Trends and Issues in the American Health System

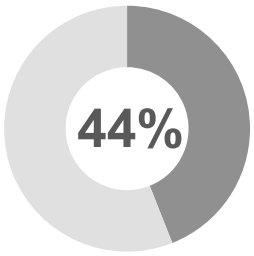
Part III: Practice Plans, Patterns, and Patient Access[P5]

Although medicine still clearly has an appeal to young people, many physicians expressed dissatisfaction with the current state of the medical profession.

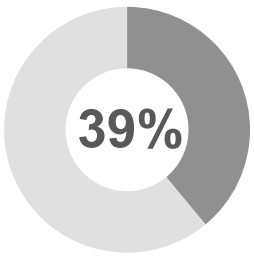
Physician Shortage and Graduate Funding	72% of physicians believe that there is a physician shortage, that more physicians should be trained, and that Congress should lift the cap on funding for physician graduate medical education.
Medical School Enrollment	Growth in medical school enrollment is (in part) a result of the creation of new medical schools and the expansion of existing ones. Since 2002, medical schools have increased the number of first year students by 21.6%.[A3] By the end of this decade, U.S. medical schools will be producing 27,000 graduates annually, 50% more than in 2000.[C7]
Cap on Funding for Residency Positions	In 1997 Congress placed a cap on federal funding of graduate medical education (GME)—largely provided through the Medicare program—which limited the number of residency positions available nationwide. Since 1997, the number of residency positions has increased only marginally while the population has increased by tens of millions and grown older. There appears to be no momentum for removing the cap. Higher medical school enrollment will not alleviate the physician shortage unless more residency training slots are created at the nation's teaching hospitals to accommodate the rising number of medical graduates.
Limiting Patient Access	Although over 56% of physicians plan to continue practicing as usual, almost 44% plan to take one or more steps that would reduce patient access to their services. Over 18% will cut back on hours. Over 10% will seek non-clinical jobs in healthcare. Over 9% will retire within one to three years. Almost 8% will cut back on the number of patients they see. An additional 29% will adopt a practice style (locum tenens, hospital employment, concierge, or part-time) likely to reduce their patient load. About 2.4% will close their practice to new patients. All of these strategies will lead to the potential loss of tens of thousands of physicians from the workforce, further compounding the physician shortage.
Retirement Plans	39% of physicians indicate that, due to changes in the healthcare system, they will accelerate their retirement plans.
Switching to Concierge	There are a variety on concierge/direct pay practice styles. What they have in common is a contract for services between the physician and the patient which partially or wholly eliminates third party payers. Over 7% of physicians are already practicing in this manner, and more than 13% plan to transition (in whole or part) to this practice style at some point.



72% of physicians believe that there is a physician shortage



44% of physicians plan to take one or more steps that would reduce patient access to their services



39% of physicians indicate that due to changes in the healthcare system, they will accelerate their retirement plans

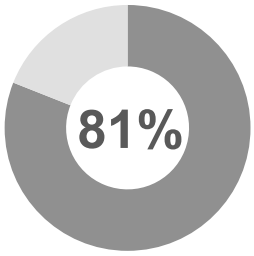
Trends and Issues in the American Health System

Part III: Practice Plans, Patterns, and Patient Access[P5] (continued)

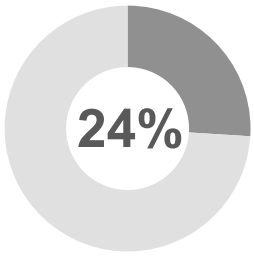
Hours per Week	Physicians work an average of 53 hours a week (virtually the identical number of hours they reported working in 2012, but down from 57 hours in 2008). Physicians typically spend 20% of their time on non-clinical paperwork.
Patients per Day	Since 2008 the average number of patients seen per day has declined from 23.4 to 19.5. Typically, practice owners (who pay themselves after expenses are paid) see more patients per day than employed physicians (who are paid salaries and are less tied to the volume of patients they see).
Capacity	81% of physicians describe themselves as either overextended or at full capacity (up from 75% in 2012 and 76% in 2008). Only 19% say they have time to see more patients. All four types of "new guard" physicians report having less capacity in their practices than "old guard" physicians. Employed physicians have less capacity than practice owners, primary care physicians have less capacity than specialists, female physicians have less capacity than males, and younger physicians have less capacity than older physicians.
Medicare & Medicaid Patients	The ranks of both Medicare and Medicaid patients are increasing rapidly. In 2011, over 75 million baby boomers began turning 65 and qualifying for Medicare. On average, more than 49% of patients physicians see are enrolled in Medicare or Medicaid. About 24% of physicians no longer see Medicare patients or limit the number of Medicare patients they see. Over 34% (more than 1/3) of primary care physicians have reduced access to Medicare patients, suggesting that many Medicare patients may have difficulty finding "gatekeeper" physicians to obtain entry into the healthcare system. Over 38% of physicians no longer see Medicaid patients or limit the number of Medicaid patients they see. Over 40% of primary care physicians do not see Medicaid patients or limit the number they see, calling into question the ability of a growing number of Medicaid patients to access the healthcare system.
Impact of ICD-10	While the hours physicians spend on paperwork have decreased over the last four years, implementation of a new system of diagnostic coding that may reverse this trend. The International Classification of Disease codes (ICD-9) are more than four decades old. After October, 2015, when replaced by ICD-10, the number of diagnostic codes from which physicians must select increased from about 14,000 to roughly 69,000. Physicians were clearly dubious about the administrative and clinical effect implementation of ICD-10 was going to have on their practices. At the time of the survey, 50.1% said it will create a severe administrative problem, while 75.3% said it will unnecessarily complicate coding. Only 11.3% said it will improve diagnosis/quality of care.

53 hrs/wk

the average physician works. 20% of that time spent on non-clinical paperwork



81% of physicians describe themselves as either overextended or at full capacity, up from 75% in 2012 and 76% in 2008. Only 19% say they have time to see more patients.



24% of physicians no longer see Medicare patients or limit the number of Medicare patients they see

Trends and Issues in the American Health System

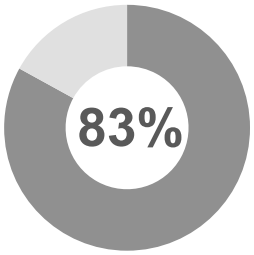
Part IV: Health Reform & New Delivery Models[P5]

The $3 trillion-a-year U.S. healthcare industry is comprised of some 10 million healthcare professionals, thousands of hospital and medical group administrators, federal and state governments, and insurance companies. The entire system is involved in a historic experiment to determine if it can be shifted from a model that is driven by volume of services performed to a model driven by the value of such services.

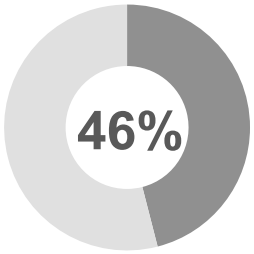
At the center of this potential transformation are physicians. Through patient diagnoses, hospital admissions, drug prescriptions, tests, treatments, and procedures, physicians largely determine the quality and cost of healthcare. Though doctors receive only about 20% of dollars spent on healthcare, by directing the care patients receive they control close to 90% of healthcare spending.[B3]

This section reflects the degree to which physicians have embraced elements of healthcare reform.

Accountable Care Organizations (ACOs)	Under a reformed system, ACOs represent the new model of healthcare delivery by caring for large population groups in systems integrating hospitals and physicians, and by accepting capitated, quality-based payments. This emerging delivery model has attracted a significant degree of physician participation. Some ACOs are even physician-owned and physician-led. Over one quarter (26.4%) of physicians surveyed participate in ACOs, though only 12.7% are optimistic that ACOs will achieve the goals of enhancing quality and decrease costs.
Hospital Employment of Physicians	ACOs (and other large, integrated systems operating as ACOs) consider employment the best way to persuade doctors to adopt team-based care, accept value-based reimbursement, utilize treatment protocols, and otherwise shape their behavior. More than 83% of practice owners do not believe hospital employment of physicians is a positive trend, compared to only 50.6% of employed doctors. Close to 69% of older physicians do not believe hospital employment of physicians is a positive trend, compared to only 52.6% of younger physicians. Specialists are more pessimistic than primary care physicians.
Electronic Medical Records (EMR)	The success of ACOs (and other integrated systems) depends on the strategic alignment of hospitals, medical groups, physicians, and other clinical professionals, all of whom must be able to communicate on patient treatment plans and related matters. A key component of these emerging delivery models is electronic medical records (EMR). Under the ACA, all physicians must adopt EMR and participate in the Physician Quality Reporting System (PQRS) or face reductions in Medicare reimbursement. 85% of physicians have adopted electronic medical records (up from 69% in 2012). Only 32% of physicians say that EMR has improved their efficiency, while 46% say that it has detracted from their efficiency.



83% of practice owners do not believe hospital employment of physicians is a positive trend, compared to only 50.6% of employed doctors

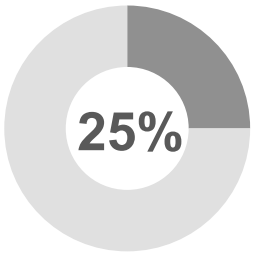


46% of physicians say that EMR has detracted from their efficiency

Trends and Issues in the American Health System

Part IV: Health Reform & New Delivery Models[P5] (continued)

State/Federal Exchanges/ Marketplaces	Two mechanisms for implementing healthcare reform are ACOs (and other integrated delivery models) and the near universal use of EMR. An additional mechanism is insurance *exchanges* (also known as *marketplaces*) run either by state governments or the federal government. These exchanges are used to expand access to health care, a primary goal of healthcare reform. However, if physicians elect not to participate in the exchanges/marketplaces, or they are restricted from doing so, actual access to care will be limited. Currently, 33.3% of physicians participate in an insurance product offered through their state exchanges, while an additional 9.4% plan to. More than 28% of physicians have no plans to participate while another 28% are unsure.
Affordable Care Act (ACA)	When asked to grade the ACA as a vehicle for healthcare reform, just over one-quarter of physicians (25.4%) gave the ACA a positive grade of A or B; about 29% gave the ACA a neutral C grade; and close to 46% gave the ACA a negative grade of D or F. Even in the most positive groups of physicians, less than 31% gave the ACA an A or B. In all groups the majority gave the ACA a C, D or F. Continuing a pattern, younger, employed, female, and primary care physicians exhibited a more positive attitude about the ACA than older, practice owner, male, and specialist physicians.



25.4% of physicians gave the ACA a positive grade of A or B, 46% gave a grade of D or F

Trends and Issues in the American Health System

Part V: Selections from Physicians' Comments[P5]

This section includes comments and suggestions from physicians regarding various topics in the Physicians Foundation's 2014 Survey of America's Physicians[P5] and a Medscape article about ICD-10.[H3]

Over-regulation and Bureaucracy	"Rather than *adding* many thousands of pages of laws and bureaucrats, health reform would be better served by *removing* many thousands of pages of laws and bureaucrats." "*Minimize* regulations, not *add* more! Allow the free market to reign." "Return to a free market. Reduce state and federal involvement." "In many ways large and small, physicians are over-regulated and constrained, especially by insurance companies. Requirements for pre-authorization, preferred medication lists, and similar intrusions into the doctor-patient relationship are killing us." "Why should a nurse (who works for an insurance company) have the authority to review an order a doctor (who actually knows the patient) wrote, and the nurse (who never met the patient) gets to decide if the test is medically necessary and if the insurance company will pay for it?" "Continuing changes in documentation and endless redundant prior authorization forms make me feel as if medicine is becoming a mechanistic exercise with less and less art involved. If I wanted a job filling out forms, I would have gone into data entry. If I wanted to follow an algorithm for every clinical decision, I would have become a car mechanic or an electrician." "At some point, you will have succeeded in driving away the well-educated doctors, and in their place will be nurses, physicians' assistants (PAs), and healthcare workers who read protocols, follow guidelines to the letter, and have no idea how to approach complex medical care in a person who is a unique individual. When that happens to you or your loved one, you will be frustrated and pound your fists wondering why no one can help you. You will ask, where have all the doctors gone?" "I'm a Canadian physician practicing in the United States. The politicians and policy makers need to understand that government involvement in healthcare never works." "Get government OUT of healthcare."

Trends and Issues in the American Health System

Part V: Selections from Physicians' Comments[P5] (continued)

Physician Shortage	"Given the current and worsening physician shortage, expedite the process for well-trained and well-educated foreign physicians to obtain residencies, medical licenses, and working visas in the U.S." "Establish a network of retirement-age doctors who still want to work part-time." "In order to train more physicians, we need more residency slots funded by the government. Period." "Increase residency training slots across all specialties, particularly primary care." "To draw more medical students to the field, increase reimbursement rates for primary care physicians." "Pay for all medical students who are accepted and have them complete obligatory service in underserved areas for two years after residency." "Increase access to healthcare for Americans by instituting a program for postgraduate medical students— requiring one to two years of practice in rural communities in return for reducing medical school loan debt." "The decision to limit work hours of residents has led to a hand-off of problems and an attitude that puts the patient into second place. It has harmed medicine more than it has helped. The new rules have…created physicians who don't understand that medicine requires sacrifice."
Fee-for-Service (FFS)	"Why are physicians being told fee-for-service is evil? Every other profession is paid per unit of productivity. If any given lawyer or plumber is better than another, they are allowed to charge a higher fee, and no one thinks this is wrong." "Stop this silly talk about doing away with fee-for-service. It will only increase the movement of physicians becoming clock-watching salarymen."
Physician Autonomy	"The system is broken… I am tired of being used, abused and lied to. Has anyone here woken up to the fact that we [physicians] are always the last ones to be considered in the equation of change?" "Put medical care back in the control of doctors. Let us police our own, order what we feel is needed and, if the doctor determines the need for it, require that insurance pay for it." "Trust doctors to do the job we are trained to do. Stop treating our profession as if we are all ex-cons who need constant monitoring lest we commit fraud or some other crime." **Note:** The Recovery Audit Contractor (RAC) program was created through the Medicare Modernization Act of 2003 (MMA) to identify and recover improper Medicare payments paid to healthcare providers under fee-for-service (FFS) Medicare plans. "RAC audits are insulting. It's classic Monday morning quarterbacking. After the patient is discharged from the hospital, nearly anyone could look at the chart and state how they could have done better."
Market Model	"By reducing autonomy and reimbursements, physicians are slowly being squeezed out of the ability to provide the care they think is best. Practices will become more and more a matter of how many patients can you run through the office in a day. This is bad for physicians, bad for patients, and will significantly harm the patient/physician relationship." "U.S. citizens are no different than other nationals. They need low infant mortality, good prenatal care, universal vaccinations, wellness for young adults, fair pricing on pharmaceuticals, good post-operative care, and assistance for the elderly. The market model of healthcare is an aberration and heartless."

Trends and Issues in the American Health System

Part V: Selections from Physicians' Comments[P5] (continued)

Single-Payer System	"Avoid single payer without a private alternative." "A single-payer system (Medicare for all) is the only viable solution." "A single-payer system is the only way to create universal access and keep costs down." "We need a single-payer system that provides better coordination of care, reduces overhead and management costs, reduces complexity of reimbursements, and provides a single formulary. We also need federal tort reform."
Affordable Care Act (ACA) (AKA Obamacare)	"Giving everyone a Medicaid or Obamacare card while few doctors accept these insurances is not the solution. Let's increase free clinics at sites of need, and pay young physicians well to work and train in them." "Repeal Obamacare!"
ICD-10	"As human beings, we eventually get used to anything and never question the routine. Did anyone stop to think why a doctor and a patient need a coder?" "This is a perfect example of why we DO NOT want government-run healthcare any more than we have it now." "No other country except the USA uses these codes for billing. These codes do not improve patient care. They do not make medicine more affordable but more expensive. These codes take more of doctors' time that could be devoted to either patient care or extra time documenting for an already ridiculous system. How about we as doctors say 'no' to the perilous trajectory that we are on into a meaningless time-sucking job that everyone wants to control (to everyone's detriment) and no one wants to pay you for." "Another example of unneeded (clinically) red tape that will further tie up office staff, impede practitioners and hospitals from being paid fairly, and take more time from patient contact and put that time in front of a computer." "I'd like to see an article investigating who is responsible for 'inventing' ICD-10, and what input have our organizations (AMA etc.) had in developing it." "My understanding is that the AMA holds the patent on this entire ICD fiasco. Hence profit, profit, profit!" "Abandon ICD-10. This is an enormous cost to all providers everywhere and pointless at this time. It is hindering progress and limiting patient care across the board."
Physician Overload	"This last year I have watched many local FPs retire or change practices, increasing my work immensely. Add the paperwork of the ACA and ICD-10, and I am at the point of joining them." "Remember, we went to medical school to learn how to take care of patients, not to improve our typing skills."
Reducing the Cost of Medical Education	"The overwhelming cost of medical education (with the average debt for a U.S. graduate at $170,000) is exorbitant and embarrassing. The majority of the developed world has nominal or no charge for a medical education, which allows physicians to practice general medicine without drowning in debt. If physicians started their professional life with less debt, they would be able to accept less salary and practice in underserved areas without feeling like indentured servants."

Trends and Issues in the American Health System

Part V: Selections from Physicians' Comments[P5] (continued)

Reducing the Cost of Health Insurance	"Allow interstate insurance products." "Allowing private insurance firms to offer plans across state lines would reduce the cost of health insurance." "Allow healthcare insurance to be purchased on a national basis, permitting the market to control rates, advantages, and enrollments to a given company." "Physicians should no longer contract with insurance companies for outpatient care. They should simply post their fees for transparency and [let] consumers make informed choices."
Physician Liability	"Stop forcing us to practice defensive medicine. Alleviate some of the liability burden so I can use my clinical judgment more and expensive tests less."
Excessive Cost of Healthcare	"Hospitals (in general) are incentivized to provide more care, never less care. There is simply no incentive for hospitals to make an effort to educate people on how to appropriately use the healthcare system." "Help *me* help *you* by reducing administrative burdens and malpractice threats, and then doctors can show more sensitivity to costs of care." "A major contributor to excessive cost of medical care is continuing to reward for volume of tests, procedures, and visits performed. Ultimately, reimbursement will have to resemble HMO panels of patients for which a provider is responsible coupled with measurements of quality." "Put the responsibility for the cost of healthcare back into the hands of patients by eliminating the middle man. Have the patient pay at the time of service, then seek reimbursement from their insurance providers." "It should be nationally outlawed that integrated delivery networks charge higher routine fees and inflated facility fees for services that previously have been provided in the office of physicians whose practices they purchased and simply re-categorized as 'satellites' of the hospital."
Two-Tiered System	"A National Health Service providing basic medical care to all would be a vast improvement on the current scenario." "If the country wants socialized medicine, let that be for primary care so that everyone has access to care and so chronic illness can be prevented. Continue insurance for more serious cases and for specialty care." "Like other successful national programs, any successful health system will involve a two-tiered system. The basics can be funded by the government, but if you are 83 and demented, you may not qualify for a hip replacement, unless your family has the money to pay for it."
Medicare	"Immediately cease cutting Medicare reimbursement. It's hard to find doctors who can afford to take it." "Medicare should increase the RVU value for Evaluation and Management codes by 5% and cut everything else…some by as much as 40%."
Medicaid	"Rather than increasing Medicaid or spending millions on a poorly run website, the government should have set up government clinics for the indigent." "Do away with the Veterans Administration and assign all veterans to Medicaid-like insurance."

Trends and Issues in the American Health System

Part V: Selections from Physicians' Comments[P5] (continued)

Patient Accountability	[Part of the solution is:] "Engagement and empowerment of patients, who need to take responsibility for their actions and be responsible for their own health care through patient portals and other means of communication. We (as physicians) are consultants to their health, however many blame us for the maladies they have which are generic or self-induced, most of which we cannot fix, but we treat and advise." "People don't play and exercise. We watch TV, play video games, stick our noses in our cell phones. People who make bad choices should have to face the consequences. IV drug and ETOH abusers get liver transplants? No. Smokers get lung transplants? No." "I feel very negative and pessimistic about the future of medicine. Pay is based on quality measures. Patients that do not stop smoking or who do not lose weight will bring down those numbers and reduce the amount you are paid. I am already aware of doctors who are dumping their noncompliant patients from their practice so that their numbers look good, and that is only going to happen more often. Apparently the folks who dreamed up pay-for-performance didn't think of that. For those reasons (and many more) I hold out no hope for real quality medical care in the future"
Patient Deductibles	"Everyone (and I do mean everyone) needs to have a little skin in the game. Even Medicaid patients should be charged a small co-pay in order to discourage them from using the system inappropriately." "People should have catastrophic insurance with high deductibles. If people had to pay out of pocket, they would no longer seek care for runny noses and rolled ankles." "Put the responsibility for the cost of healthcare back into the hands of patients by eliminating the middle man. Have the patient pay at the time of service then seek reimbursement from their insurance providers." "We just need those monster deductibles to hit. Soon patients won't be so insistent on 'using that insurance.'"
Electronic Medical Records (EMR)	"Centralize EMR so they are accessible by any institution anywhere in the country." "EMR charting is not safer. It is simply creating errors of an entirely new kind that are harder for the user to identify and fix. When the power goes out, we know nothing about our patients. To print four pages of typed notes for a 10-minute office visit is garbage."
Palliative Care	"There needs to be a culture change. Patients who are terminally ill or plagued with many medical issues at the end of life should not be afraid of going the palliative care route." "Increase funding and support for palliative care. Make sure people understand what hospice is and that, for terminal patients, spending the rest of their lives either in a hospital or in fear of being admitted to a hospital is not good."

Trends and Issues in the American Health System

Part V: Selections from Physicians' Comments[P5] (continued)

Physician Dissatisfaction	"I still enjoy the inside of the exam room….but hallways, workstations, and meeting rooms all are negative parts of my day or evening and bring me no joy." "Doctors are angry because they sacrificed everything: their time, their families, their hobbies, their spirits, and their lives for their patients. We think about our patients, we care about them and worry about them. And at the same time, we feel like doctors are always vilified and treated like crooks. It's so demeaning and depressing." "I have been a family physician in a rural area of Maine for over 40 years and loved what I did. Many of my patients have been with me for all 40 of those years and they are not just patients, they are friends. I no longer love what I do. I have not yet retired because I am loyal to my patients. I don't want to abandon them to the failing system of medical care that is taking shape." "To my colleagues… In light of the many frustrations now faced within the profession, I suggest scheduling some personal time off for the purpose of reflection and rest. If you have lost your concern for people, consider volunteering elsewhere in the world, in order to regain perspective and your original sense of priorities."

All of these trends and issues in the American healthcare system have a profound effect on the effectiveness of ongoing medical training, which poses an additional strain on physicians' time and energy.

Comparing and Contrasting Training Delivery Methods

Introduction

A number of training methodologies exist, and the latest trend is a shift from traditional lecture methods, to E-Learning methods. The scenarios and targeted objectives should be used to guide the most effective method to meet the learning needs. In this section we will compare and contrast some of the most widely used training delivery methods.

Lecture Method

Description. A lecture is an extensive oral presentation of material. During a pure lecture, communication is one way—from trainer to learners. The learners listen, observe, and perhaps take notes. Several variations in the lecture format allow it to be more or less formal and/or interactive.

Objectives. The pure lecture is most useful when learners lack declarative knowledge or have attitudes that conflict with the training objectives.

Advantages & Disadvantages. The lecture is best used for creating a general understanding of a topic. It can be useful in situations in which a large number of people must be given a limited amount of information in a relatively short period. Another major benefit of the lecture is that it is interactive, and learners can ask questions or have the presenter change the pace of the lecture if necessary. The only added value provided by the lecture is credibility that may be attached to the lecturer or the focus and emphasis provided by trainer presentation skills. Because the pure lecture provides only information, its usefulness is limited. It is not effective for learning large amounts of material in a short time period. Learners will forget information in direct proportion to the amount of information provided. Thus, an effective lecture should not contain too many learning points. When the only training objective is to have learners acquire specific factual information, better learning can be achieved at less cost by putting the information into text. This allows learners to read the material at their leisure and as often as necessary to retain the material.

Discussion Method

Description. The discussion method uses two-way communication between the lecturer and the learners to increase learning opportunities. This method uses a short lecture (20 minute or less) to provide learners with basic information followed by a discussion (between the learners and the trainer, or among the learners) that supports, reinforces, and expands upon the information presented in the short lecture. Verbal and nonverbal feedback from learners allows the trainer to determine if the desired learning has occurred. If not, the trainer may need to spend more time on this area and/or present the information again, but in a different manner.

Comparing and Contrasting Training Delivery Methods

Objectives. Because of the discussion and questioning components, the discussion method is more effective than the pure lecture for learning procedural and strategic knowledge. Both the lecture and discussion methods are useful for changing or developing attitudes, though the discussion method is more effective. If the training objective is skill improvement, neither the lecture or discussion method is appropriate.

Advantages & Disadvantages. Discussions allow the learner to be actively engaged in the content of the lecture, which improves recall and use in the future. Questioning and discussions enhance learning because they provide clarification and keep learners focused on the material. Trainer questions stimulate thinking about the key learning points. Learner questions demonstrate the level of understanding about the content of the lecture.

E-Learning

Descriptions. E-learning encompasses several different types of technology-assisted training, such as distance learning, computer-based training (CBT), and web-based training (WBT).

Distance learning occurs when trainers and learners are in remote locations. Typically, technology broadcasts the trainer's lecture to many learners in many separate locations. Computer-based training and web-based training are very similar. With computer-based training, the training program is stored on a hard-drive or CD-ROM. The computer delivers the content using any combination of text, video, audio, chat rooms, or interactive assessment. It can be as basic as reading text on a screen or as advanced as answering quiz questions based on a computerized video that the learner has viewed.

Conversely, web-based training (WBT) is housed online through either a company's intranet or the world-wide web (WWW).

Objectives. E-learning is effective at developing declarative and (in particular) procedural knowledge. It can be useful in modifying attitudes and for developing some types of skills. E-learning develops declarative knowledge through repeated presentation of facts, using a variety of formats and presentation styles. It develops procedural knowledge by allowing learners to practice applying the knowledge to various situations simulated by the software. It can also do an excellent job of describing conditional/strategic knowledge—when and how to apply knowledge to various situations. E-learning can also be effective at developing or modifying attitudes.

Comparing and Contrasting Training Delivery Methods

Advantages & Disadvantages. As an alternative to classroom-based training, e-learning provides a number of advantages. It can:

- Increase access to training for learners in locations around the nation or world
- Reduce the cost of training(including lost time) associated with travel to a training location
- Allow learners to progress at their own pace, reducing anxiety or boredom
- Provide instructional consistency, by offering the same training content to learners
- Provide a safe method for learning hazardous tasks with computer simulations

Distance learning provides many of the same advantages and disadvantages as the lecture method. Distance learning can be much less expensive than paying for learners in multiple locations to travel for a lecture (especially for physician learners, where time is scarce and costly), but it may reduce motivation to learn because of the remoteness of the trainer.

E-learning technology is valuable because it can alter the visual and textual elements presented and how objects, events, and their relationships are perceived. CBT and WBT can portray the factual relationships among objects and events, as well as the consequences of particular courses of action. They can automatically document learners' responses, interpret them, and provide appropriate practice modules to improve areas of weakness.

Because computer-based training is stored on a hard-drive or CD-ROM, it is not easy to update and may be more difficult for employees to access. Because web-based training is housed online through a company's intranet or the world-wide web, updates to content are quick and relatively easy. If an error in the training content is found, one update on the training program housed on a server updates the content for every learner who accesses it after that point. WBT increases the accessibility of training. Employees may even be able to train from their home computers. With e-learning, since the objects and events are simulated, rather than real, the emotional or affective side of attitudes may not be activated. There is no opportunity to discuss attitudes with others in a setting where a trainer can monitor, direct, and reinforce the discussion to support the desired attitude(s).

Skill development is limited by the software's ability to mimic the learner's job environment and context. For some situations (such as training employees in practice management software or an electronic health record system) e-learning is an appropriate choice for teaching

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skills because it can easily simulate the tasks and situations learners will face on the job. Furthermore, newer systems not only analyze a learners ability to demonstrate the ability to replicate the skill accurately, but Fluency, which is a measure of both accuracy and time which better simulates performance needs extrapolated from the training environment to actual working conditions.

This may be one reason many adult learners indicate a preference for e-learning to be combined with some form of instructor-based training. Learners often prefer blended training, which combines both computer and face-to-face training.

Simulations

Descriptions. Simulations mimic the processes, events, and circumstances of the learner's job. Some types of simulations are equipment simulators, business games, in-basket exercises, case studies, role playing, and behavior modeling.

Equipment Simulators are mechanical devices that incorporate the same procedures, movements and/or decision processes that learners must use with equipment on the job. To be effective the simulator must replicate, as closely as possible, the physical and psychological (time pressures, conflicting demands, etc.) aspects of the job site. To facilitate this, the equipment operators and their supervisors should be involved in the simulation design and pre-testing. This increases the degree of fidelity between the simulation and the work setting and reduces potential resistance to the training. Among those trained with this method are airline pilots, air traffic controllers, military personnel, engineers, critical care specialists, and surgeons.

Business games attempt to reflect the way an industry, company, or functional area operates. They also reflect a set of relationships, rules, and principles derived from appropriate theory (e.g., economics, organizational behavior, etc.). Many business games (industry/company simulations), represent the total organization, but some (functional simulations) focus on the functional responsibilities of particular positions within an organization (e.g., human resource manager, revenue cycle manager).

The in-basket technique simulates the type of decisions that would typically be handled in a particular position (such as a (such as a clinical practice manager). It affords an opportunity to assess and/or develop decision-making skills and attitudes.

Case studies are most often used to simulate strategic decision-making situations, rather than the day-to-day decisions that occur in the

Comparing and Contrasting Training Delivery Methods

in-basket. The learner is first presented with a history of the situation in which a real or imaginary organization finds itself. The key elements and problems (as perceived by the organization's key decision makers) may also be provided. Learners are asked to respond to a set of questions or objectives. Responses are typically (though not always) in written form and may range from a few pages in length to more than a hundred. Longer cases require extensive analysis and assessment of the information for its relevance to the decisions being made. Some require the learner to gather information beyond what was in the case. Once individuals have arrived at their solutions, they discuss the diagnoses and solutions that have been generated in small groups, large groups, or both.

Role play is a simulation of a single event or situation. Learners who are actors in the role play are provided with a general description of the situation, a description of their roles (e.g., their objectives, emotions, and concerns), and the problem they face.

Role plays differ in the amount of structure they provide to the actors. A structured role play provides learners with a great deal of detail about the situation that has brought the characters together. It also provides in greater detail each character's attitudes, needs, opinions, and so on.

Structured role plays may even provide a scripted dialog between the characters dialog between the characters (such as the patient and healthcare provider). This type of role play is used primarily to develop and practice interpersonal skills such as communication, conflict resolution, and group decision making. Spontaneous role plays are loosely constructed scenarios in which one learner plays herself while others play people that the learner has interacted with in the past (or will in the future). The objective of this type of role play is to develop insight into one's own behavior and its impact on others. How much structure is appropriate in the scenario will depend on the learning objectives.

Whether structured or spontaneous, role plays may also differ based on the number of learners involved. Single, multiple, and role-rotation formats provide for more or less participation in the role play.

> In a single role play, one group of learners role plays while the rest of the learners observe. While observing, other learners analyze the interactions and identify learning points

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In a multiple role play, all learners are formed into groups, and each group acts out the scenario simultaneously. At the conclusion, each group analyzes what happened and identifies learning points. The groups may then report a summary of their learning to the other groups, followed by a general discussion.

The role-rotation method begins as either a single or multiple role play. However, when the learners have interacted for a period of time, the role play is stopped. Observers then discuss what has happened so far and what can be learned from it. After the discussion, the role play resumes with different learners picking up the roles from some, or all, of the characters.

Behavior modeling differs from games and role playing by providing the learner with an example of what the desired behavior looks like prior to attempting the behavior. The steps in behavior modeling can be summarized as follows:

1. Define the key skill deficiencies
2. Provide a brief overview of relevant theory
3. Specify key learning points and critical behaviors to watch for
4. Have an expert model the appropriate behaviors
5. Have learners practice the appropriate behaviors in a structured role play
6. Have the trainer and other learners provide reinforcement for appropriate imitation of the model's behavior

While this method is primarily behavioral, steps 2 and 3 reflect the cognitively-oriented learning features of the technique. While live models can be used, it is more typical to video tape the desired behavior for use in training.
Among the many types of skills that have been successfully learned using behavior modeling are interpersonal skills, patient and interviewer behavior, and safety procedures.

Advantages and Disadvantages. Simulations are not good at developing declarative knowledge. Some initial level of declarative and procedural knowledge is necessary before a simulation can be used effectively. Although some knowledge development can occur in simulations, usually other methods are required for this type of learning. Simulations provide a context in which this knowledge is applied. The focus of simulations is improving the learners' ability to apply knowledge (i.e., facts, procedures, strategies). Simulations do a good job of developing skills because they:

Simulate the important conditions and situations that occur on the job

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- Allow the learner to practice the skill
- Provide feedback about the appropriateness of their actions

Each of the different formats has particular types of skills for which they are more appropriate:

- Surgical equipment operation, and tool-usage skills are best learned through use of equipment simulators.
- Business games can effectively teach both day-to-day and strategic decision-making skills, planning, and complex problem solving. Games that simulate entire companies or industries provide a far better understanding of the big picture. They allow learners to see how their decisions and actions influence not only their immediate target but also areas that are related to that target.
- The in-basket technique is best suited to development of strategic knowledge used in making day-to-day decisions.
- Case studies are most appropriate for developing analytic skills, higher-level principles, and complex problem-solving strategies. Because learners do not actually implement their decision/solution, its focus is more on what to do (strategic knowledge) than on how to get it done (skills).
- Role play provides a good vehicle for developing interpersonal skills and personal insight, allowing learners to practice interacting with others and receiving feedback. They are an especially effective technique for creating attitude change, allowing learners to experience their feelings about their behavior and others' reactions to it.
- Single role play provides a single focus for learners and allows for feedback from the trainer. However, it may cause the role players to be embarrassed at being the center of attention, leading to failure to play the roles in an appropriate manner. It also has the drawback of not permitting the role players to observe others perform the roles.
- Multiple role play allows greater learning as each group will have played the roles somewhat differently. It allows everyone to experience the role play in a short amount of time but may reduce the quality of feedback. The trainer will not be able to observe all groups at once, and learners are usually reluctant to provide constructive feedback to their peers. In addition, learners may not have the experience or expertise to provide effective feedback. To overcome this problem, video tapes of the role plays can be used by the learner and/or trainer for evaluation.

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The role rotation method demonstrates the variety of ways the issues in the role play may be handled. Learners who are observers are more active than in the single role play since they have already participated or know they soon will be participating. A drawback is that the progress of the role play is frequently interrupted, creating additional artificiality. Again, learners may be inhibited from publicly critiquing the behavior of their fellow learners.

Behavior modeling is used primarily for skill building and almost always in combination with some other technique. Feedback to the learner is especially powerful when video is used to record both the model's and the learner's performance. Through split-screen devices, the performance of the model and the learner can be shown side by side. This allows the learner to clearly see where improvements are needed.

On-the-Job Training (OJT)

The most common method of training is on-the-job training (OJT). OJT takes many forms and can be supplemented with classroom training. Included within OJT are the job-instruction technique, apprenticeships, coaching, and mentoring.

Job-Instruction Technique (JIT)

The formalized instructional process most commonly used is called the job-instruction technique (JIT). The JIT was developed during World War II and is still one of the best techniques for implementing OJT. The JIT process has four steps: prepare, present, try out, and follow up.

Note: The two areas most often ignored in OJT programs are preparation and follow up.

Prepare. Prior to beginning training, the trainer prepares a systematic analysis and written breakdown of all required procedures. This is a detailed task analysis.

Note: Ignoring this step will prevent the trainer from seeing the job through the eyes of the learner. When the trainer is very skilled, there are many things he does on the job without thinking about them, so he is likely to overlook them.

Once the trainer has documented the procedures, he prepares an instructional plan for each learner. This is a personal needs analysis. Here, the trainer determines what the learner currently knows and does not know. The trainer first determines what knowledge, attitudes, and skills the learner currently has by interviewing the learner, as well as checking his or her personnel records and previous training completed. The trainer then compares this information to the task analysis (the required skills) and completes the instructional plan to fill in any deficiencies.

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Immediately prior to the training, the trainer orients the learner to the OJT/JIT learning process (to help the learner understand his or her role, as well as the role of the trainer) and emphasizes the importance of listening effectively and feeling comfortable asking questions. The learner becomes familiar with the steps in the JIT process so he or she knows what to expect and when it will occur.

Present. In this stage of JIT there are four activities: tell, show, demonstrate, and explain. The trainer provides an overview of the job while pointing out important items (such as where levers are located and where materials are stored.) The trainer then demonstrates how to do the job, explaining why it is done that particular way and emphasizing key learning points and safety instructions. The trainer covers the components of the job one at a time, and in the order they would normally occur.

Try Out. Prior to actually trying to do the job, the learner explains to the trainer how to do the job. This provides a safe transition from watching and listening to doing. When the learner first tries out the job, the trainer considers any error to be a function of the training, not the learner's learning ability. When the learner makes an error, the trainer uses it to allow the learner to learn what not to do and why. The trainer facilitates this by questioning the learner about his actions and guiding him in identifying the correct procedures.
Follow Up. During these initial solo efforts, the trainer checks the learner's work often enough to prevent incorrect or bad work habits and reassures the learner that it is important to ask for help. As the learner demonstrates proficiency in the job, the trainer tapers off progress checks until they are eventually eliminated.
Although there are usually factual and procedural-knowledge objectives, JIT focuses on skill development.

Apprenticeship Training

Apprenticeship training dates back to the Middle Ages, when skilled craftsmen passed on their knowledge to others as a way of preserving the guilds. They are most often found in the skilled trades and professional unions and serve as the basis for most post-graduate education in healthcare. An apprentice must be able to demonstrate mastery of all required skills and knowledge before being allowed to graduate to journeyman status. This is documented through testing and certification processes. Today, formal apprenticeship programs are partnerships between accreditation agencies, healthcare organizations, universities, and the government. They are regulated by governmental agencies (which also set standards and provide services).

Comparing and Contrasting Training Delivery Methods

Coaching

Coaching is similar to JIT above. It differs from other OJT methods in that the learner already has been working at the job for some time. Usually, coaching is directed at employees with performance deficiencies, but it can also serve as a motivational tool for those performing adequately. In healthcare, coaching is becoming increasingly popular to remediate or introduce new skills for physicians in practice (such as advanced laparoscopic techniques in surgery). Typically, the supervisor acts as the coach. Like the OJT trainer, the coach must be skilled both in how to perform the task(s) and how to train others to do them.

Viewed from the coach's perspective, the coaching process generally follows the outline below.

1	Understand the learner's job, the knowledge, attitudes, skills, and resources required to meet performance expectations, and the learner's current level of performance.
2	Meet with the learner and mutually agree on the performance objectives to be achieved.
3	Mutually arrive at a plan/schedule for achieving the performance objectives.
4	At the work site, show the learner how to achieve the objectives, observe the learner's performance, then provide feedback.
5	Repeat step 4 until performance improves.

Mentoring

Mentoring is a form of coaching in which an ongoing relationship is developed between a senior and junior employee. This technique focuses on providing the junior employee with political guidance and a clear understanding of how the organization goes about its business. Mentoring is more concerned with improving the employee's fit within the organization than improving technical aspects of performance, thus differentiating it from coaching. Generally (though not always) mentors are only provided for management-level employees.

Note: Formal OJT programs are typically conducted by employees who have superior technical knowledge and skills and can effectively use one-on-one instructional techniques. Since conducting one-on-one training is not a skill most people develop on their own, OJT typically requires a train-the-trainer component.[R1]

Trends and Issues in the American Health System

Summary of Training Delivery Methods

The following table summarizes the strengths and weaknesses of these training delivery methods:

Training Delivery Method	Knowledge			Attitudes	Skills
	Declarative	*Procedural*	*Conditional/ Strategic*		
Lecture					
• Pure Lecture	✓			✓	
• With Interactions/Questions	✓	✓	✓	✓	
Discussion (2-way Questions)	✓	✓	✓	✓	
E-learning					
• Distance Learning	✓	✓	✓	✓	
• Computer-Based Training (CBT)	✓	✓	✓	✓	✓
• Web-Based Training (WBT)	✓	✓	✓	✓	✓
Simulations					
• Equipment Simulators			✓		✓
• Business Games					
○ Company/Industry Simulations			✓		✓
○ Functional Simulations			✓		✓
• In-Basket Exercises			✓		✓
• Case Studies			✓		✓
• Role Play (Structured or Spontaneous)					
1. Single			✓	✓	✓
2. Multiple			✓	✓	✓
3. Role-Rotation			✓	✓	✓
• Behavior Modeling			✓		✓
On-the-Job Training (OJT)					
• Job Instruction Technique (JIT)	✓	✓	✓		✓
• Apprenticeship	✓	✓	✓		✓
• Coaching		✓	✓		✓
• Mentoring		✓	✓		

Note: Because no single method can do everything well, effective training must combine several delivery methods into an integrated program.

Conclusion

Developing effective medical training requires a profound understanding of:

- Current trends and issues in the American healthcare system
- Classic models of cognition and learning
- Powerful models of instructional design
- The strengths and weaknesses of various training delivery methods

In light of the rapid and pervasive changes in American healthcare, practicing physicians have never faced so many demands and constraints on their time and energy. Over 80% of doctors report being overextended or at full capacity. Given the aging physician population; the lack of funding for medical education and resident training; the advancing shortage of physicians; the shift from traditional small private offices to multi-hospital systems, consolidated medical groups, and integrated entities; the evolution from traditional full-time private practice to a range of practice styles; the trend from traditional payment models from volume-based fee-for-service to rewards for performance and value; millions of new patients demanding access to health care, increasing reliance on Electronic Medical Records (EMR), and the pressure of ICD-10 billing codes; the medical profession has approached the edge of crisis.

In order to present concepts, procedures, and strategic knowledge efficiently, medical training must comprehend the cognitive, affective, and behavioral domains, brain dominance, multiple intelligences, human information processing, and schema construction—how we sense, process, store, enhance, retain, retrieve, forget, relearn, and automate information—as well as cognitive load theory (CLT) and motivation. Training must also deliver clear, concise, user-friendly information in a way that makes optimal use of every second.

Throughout their formal education, physicians experience virtually every learning delivery model—from lectures and discussions to e-learning and simulations to on-the-job training. As physicians have to do more and more with less and less, some traditional delivery models are no longer cost-effective. As technology continues to explode, and the demand for physicians' time and energy increases, medical training must take into account all of these factors and limitations and take advantage of the most powerful media. In the foreseeable future, the most effective format for ongoing medical training will be web-based training, blended with tools that leverage data to target and personalize training, and place them all at physicians' fingertips.

About ImplementHIT

It's more than just a job to us

We are a physician owned and operated company, and not only understand how challenging the practice of medicine has become, we live it!

We set out to create a training solution for doctors, who are one of the most challenging types of learners due to competing (often critical) priorities, and their extreme lack of time (>80% are at or beyond full capacity at work). Our founder is a physician, who at the time was pursuing a PhD in Education, with a focus on physician training technology; a rare blend of skills that allowed for new discoveries that have served as the foundation for our software. We selected Google Cloud Services as our software infrastructure given it's scalability, availability (when was the last time Google went down), speed online and broad browser compatibility. We have since created a training platform like no other.

Socially Responsible

Dr. Jimenez, our founder & CEO has mentored underprivileged premed students for the last 15 years, eventually developing the Studentsofmedicine.com non-profit program which was recently integrated with ImplementHIT. In partnership with the University of Texas – Sam Houston, the program will expand the number of underprivileged premed students mentored in 2016. We believe it is our duty to support the development of future physicians from every social economic background.

"ImplementHIT has fundamentally changed the way we prepare providers for EMR implementations"

Joseph Colorafi MD, CMIO, Dignity Health

Key Features of our Training Platform

- Easily assign "bite-sized" 5-minute training modules to address INDIVIDUAL TRAINING NEEDS, minimizing wasted time with irrelevant training.
- Load an unlimited amount of YOUR OWN CONTENT using SCORM, TinCan, MP4, HTML5, SWF, PDF and more file formats
- Most extensive library of "bite-sized" training built SPECIFICALLY FOR DOCTORS, ALREADY APPROVED FOR CME.
- Machine learning algorithms built for healthcare, "Suggests" training to learners REDUCING WASTED TIME SEARCHING for meaningful content.
- Rapidly develop and deliver your own custom content in about ¼ OF THE TIME (AND COSTS) it would take using conventional tools.
- Robust tracking, and ability to export training activity from our platform INTO YOUR SYSTEM WIDE HR AND LMS PLATFORMS.

ImplementHIT

About ImplementHIT

Our Bite-Sized, Off-the-Shelf Content for Physicians

Our extensive "Off-the-Shelf" library includes 1000's of micro courses that are bite-sized (average 5 min long) build specifically for physicians, and accredited for CME Credit.

ICD-10 CM & PCS
Providers have until October 1 2016 to ensure encounters are coded to the highest level of ICD-10 specificity[C8].

E&M CODING
Medicare estimates $45.8 Billion in incorrectly paid claims, most commonly (60.1%) due to lack of documentation to support services[C9].

DIAGNOSTIC ERRORS
Diagnostic Errors contribute to approximately 10% of patient deaths, & account for 6-17 % of adverse events in Hospitals[I2].

MS-DRG / APR-DRG
98.5% of CDI programs believe their physicians could improve their documentation practices. Lack of time (47%) and understanding of importance (66.5%) listed as top 2 barriers[A5].

ANTIBIOTIC STEWARDSHIP
20-50% of all antibiotics prescribed in U.S. hospitals are either unnecessary or inappropriate, leading to serious side effects, adverse drug reactions and C. diff infection[C10].

PERI-OPERATIVE MEDICATION ERRORS 1/20 perioperative medication administrations included a Medication Error (ME) and/or Adverse Drug Event (ADE). >1/3rd of the MEs led to observed ADEs, and remaining 2/3rds had the potential for harm[N2].

CMS/NQF PERFORMANCE
By 2018, 90% of all Medicare fee-for-service payments will be tied to quality & value programs such as VBP & Readmissions Reduction Program[B6].

ADVANCED PRESCRIBE
Adverse Drug Events account for nearly 700k ED visits & 100k hospitalizations each year. It is one of the most common types of inpatient errors[A6].

ImplementHIT

About ImplementHIT

Intuitive User Interface

Customizable categories and proficiency levels that guide learning. Bite-sized 5-minute learning modules enable more detailed curriculum targeting boosting relevance and subsequently attention during learning.	Intuitive design and single click to start learning after login. Tablet friendly user interface, and broad browser compatibility (Internet Explorer 8 to Ipad Pro)	Peer feedback comparing the learner's completion with their peers (keeps physicians from falling behind) and average of peer star ratings on learning modules.

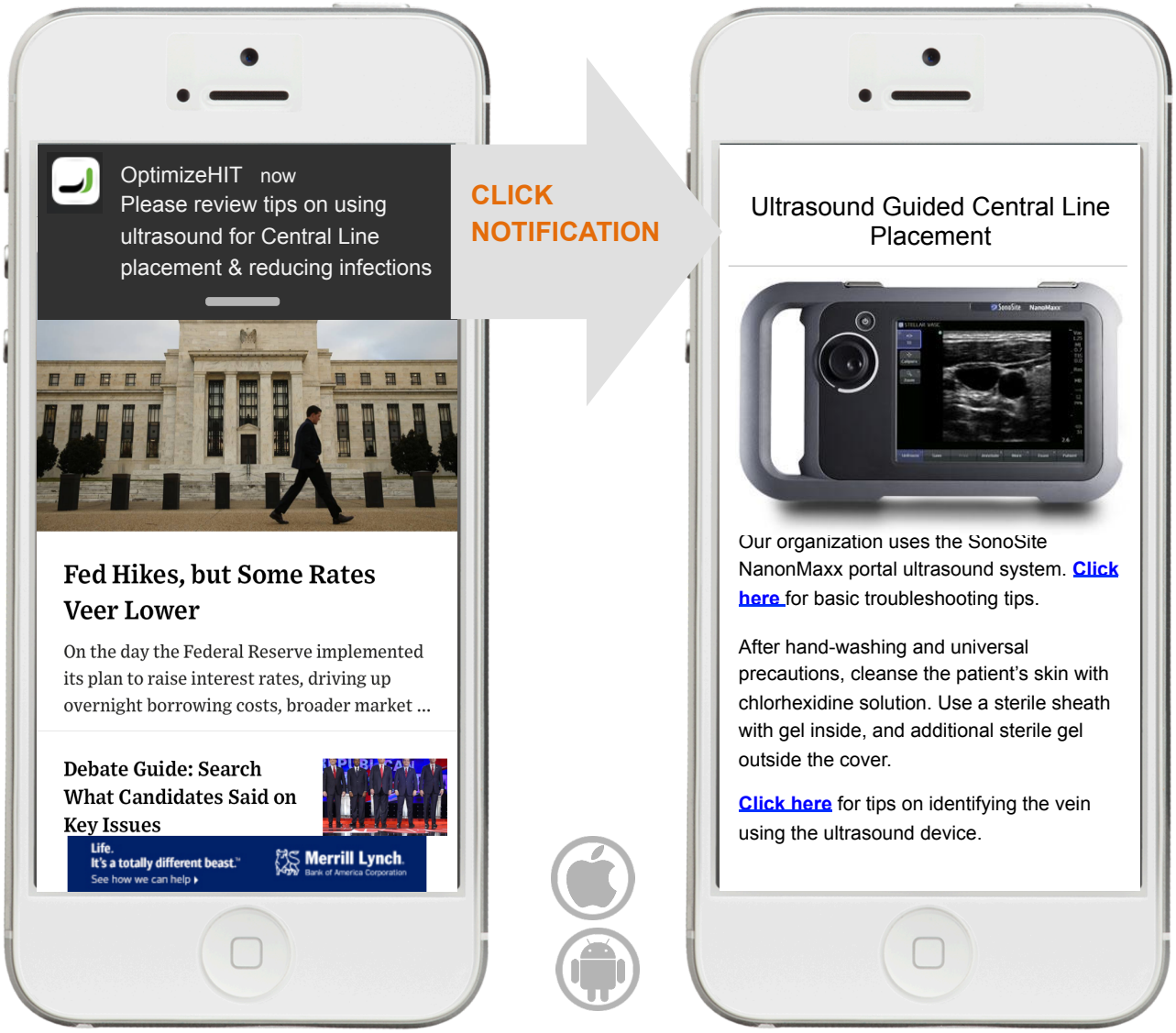
About ImplementHIT

Instant Reference via Mobile; Send Notifications and more…

OptiQuery™
Query the app via voice, keyword or browse through OptiQuery solutions for real-time performance support on any topic.

Robust Management
Create custom solutions in seconds, send one-to-one or group notifications, custom reports on learner activity, custom learner dashboards.

Library
1000's of Optiquery Solutions immediately available and approved for CME credit earned through point of care learning.

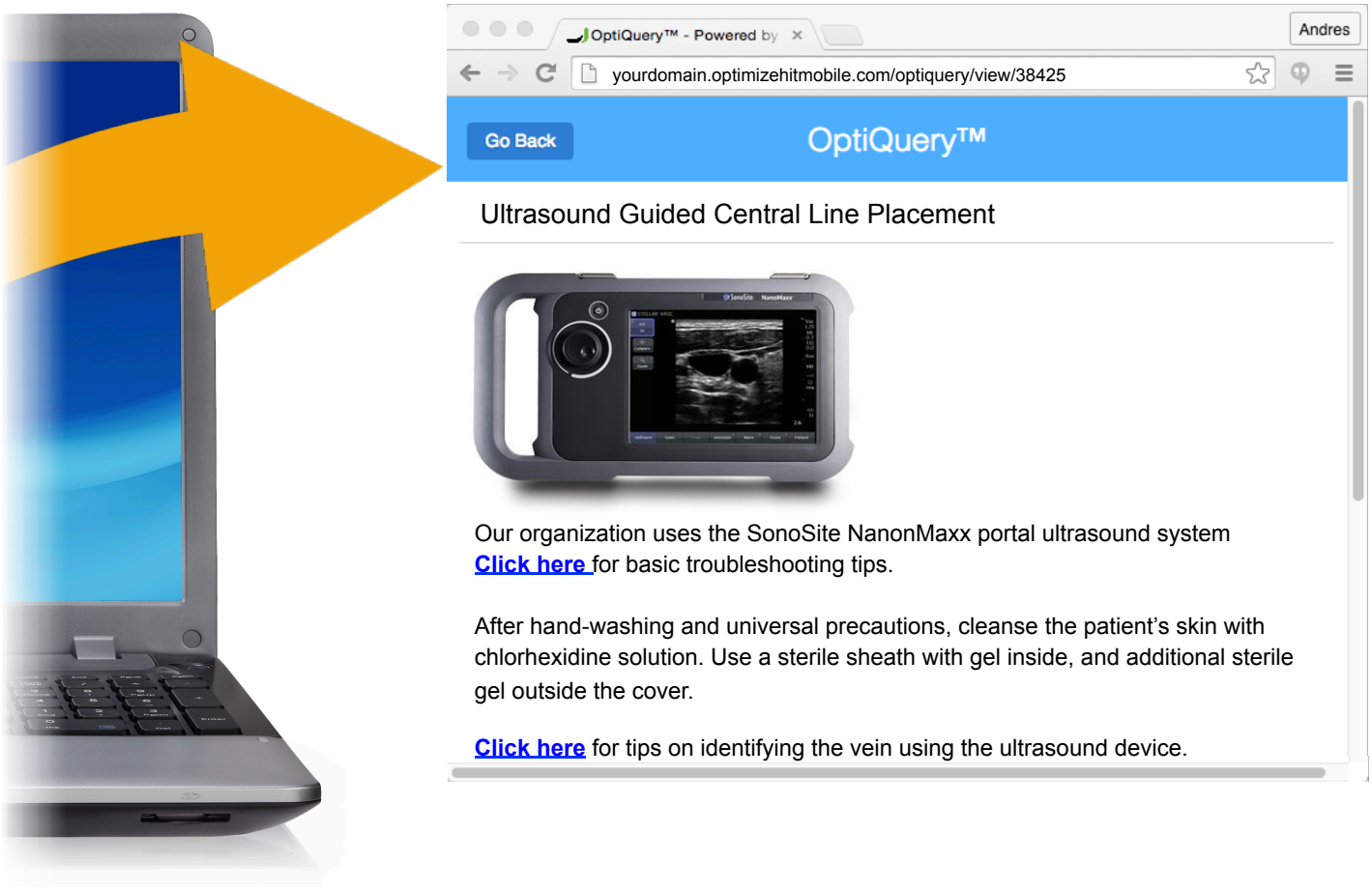


ImplementHIT

About ImplementHIT

Embed OptiQuery inside your EHR, enabling access when needed most

You can embed a link to OptiQuery from your EHR, and via Secure Sign On (SSO) provide physicians with instant access to the Peri-Operative Medication training and support including your own custom content. Physicians can even gain CME for learning at the point of care.



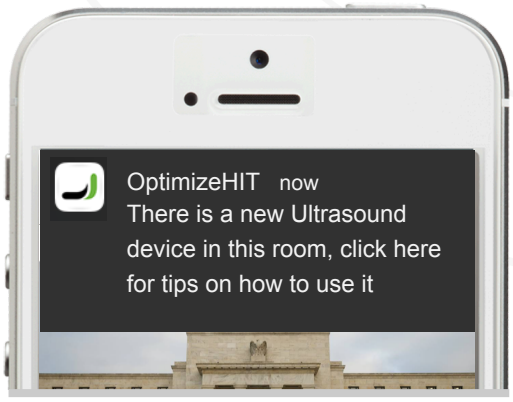
About ImplementHIT

ImplementHIT iBeacon

ImplementHIT is the first to incorporate iBeacon technology to make training relevant and timely, critical factors for engaging physicians (patents pending). Our iBeacons are tiny computers, with a powerful ARM processor, memory, Bluetooth Smart module with built-in antennas powered by a coin battery that can power the device for over 3 years. Provide a notification and relevant training (i.e. local antibiotic resistance patterns, EHR documentation best practices) via a physician's mobile phone when they approach an iBeacon at a place (i.e. ICU, exam room) or on a thing (i.e. ultrasound device, dictaphone). The possibilities are endless!

ImplementHIT iBeacon
(actual size)

Device Alerts



Unlike GPS, iBeacons will not run down battery

Learner's privacy is secure

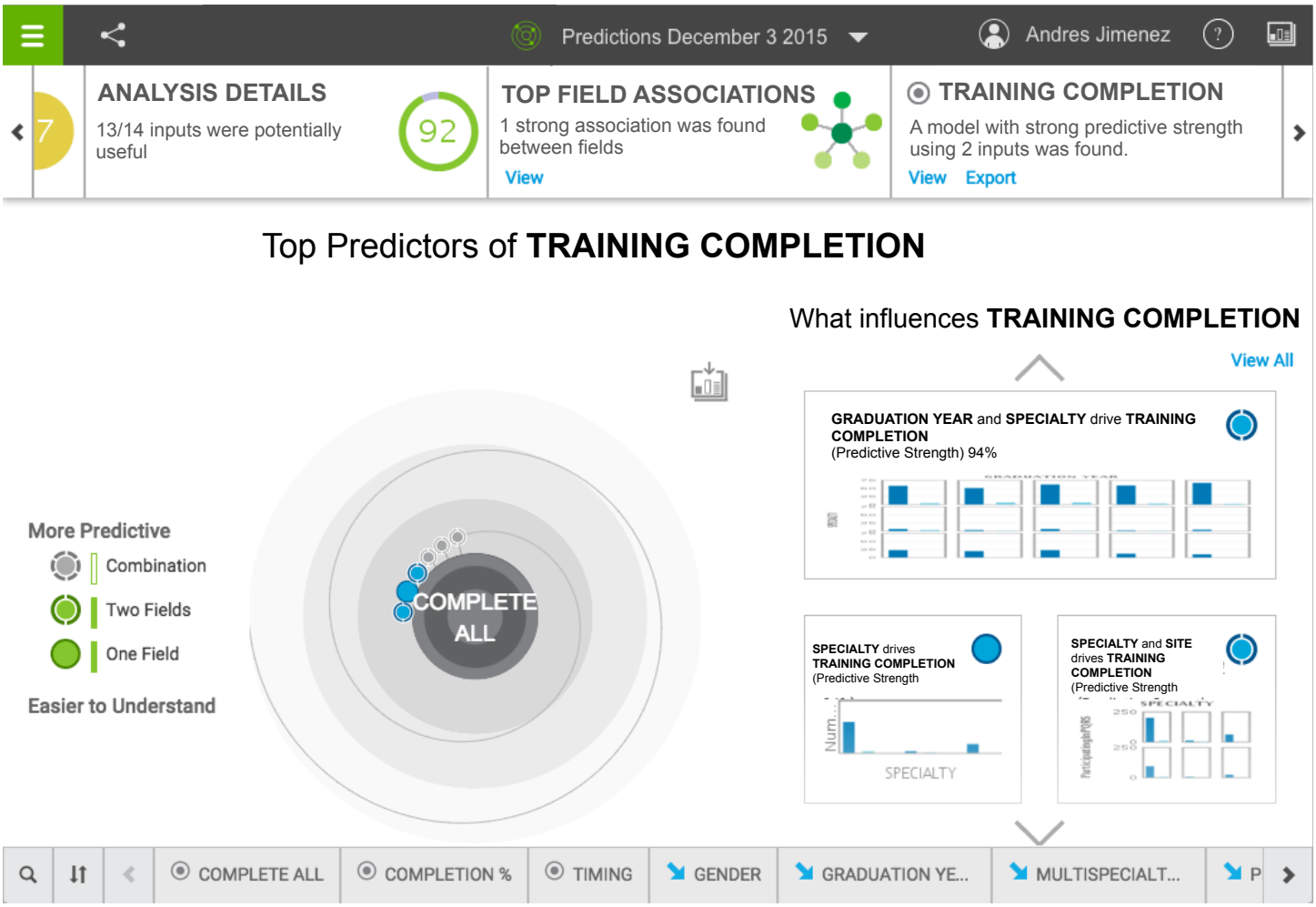
iBeacon battery lasts 40 months, and can monitor status remotely

Location Alerts

About ImplementHIT

ImplementHIT and IBM WatsonTM

ImplementHIT is an IBM Watson Ecosystem Partner, part of the IBM Watson Health initiative, brining together a wide range of data powered by one of the most advanced cognitive and analytic technologies, redefining paths to better health by putting data to work. We are using Watson in a number of ways, including predicting training outcomes to optimize training events before they even begin!

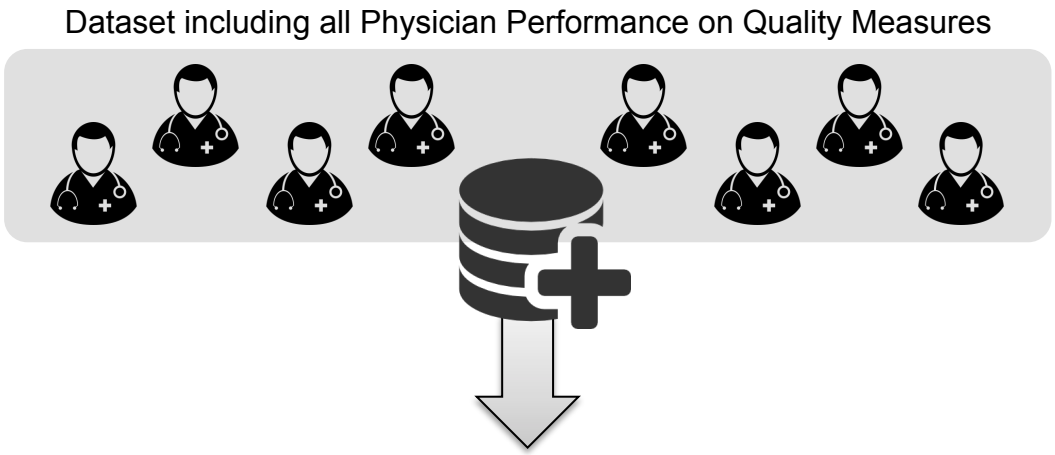


For more information about the IBM Watson Health initiative, please visit: http://www.ibm.com/smarterplanet/us/en/ibmwatson/health/

About ImplementHIT

Performance Targeting

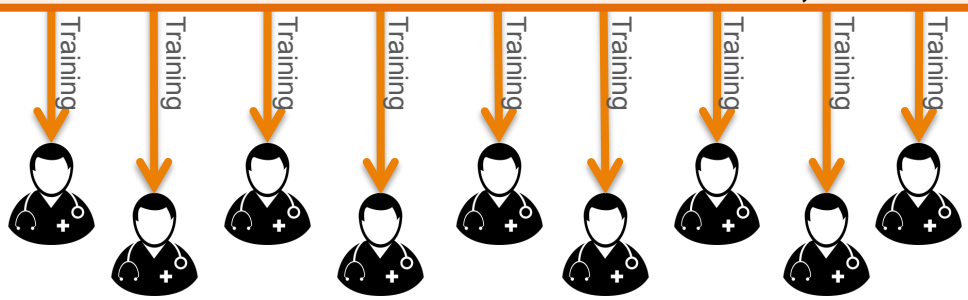
By taking into account an individual learner's performance on quality measures tied to quality initiatives such as Value Based Payment, Hospital-Acquired Conditions, Value Based Payment Modifiers and others, our platform personalizes training assigned to large groups of learners.



Upload Performance Data into Platform, Relate Measure to Training Module in Platform

Measure	Avg. Score	Reverse	Threshold	Training Module "Skill"
Central Line-Associated Bloodstream Infection (NQF #0139)	81%	☐	70%	Reducing Central Line-Associated Bloodstream Infections
Catheter-Associated Urinary Tract Infection (NQF #0138)	82%	☐	70%	Reducing Catheter-Associated Urinary Tract Infections
Surgical Site Infection (NQF #0753)	80%	☐	70%	Reducing Surgical Site Infections

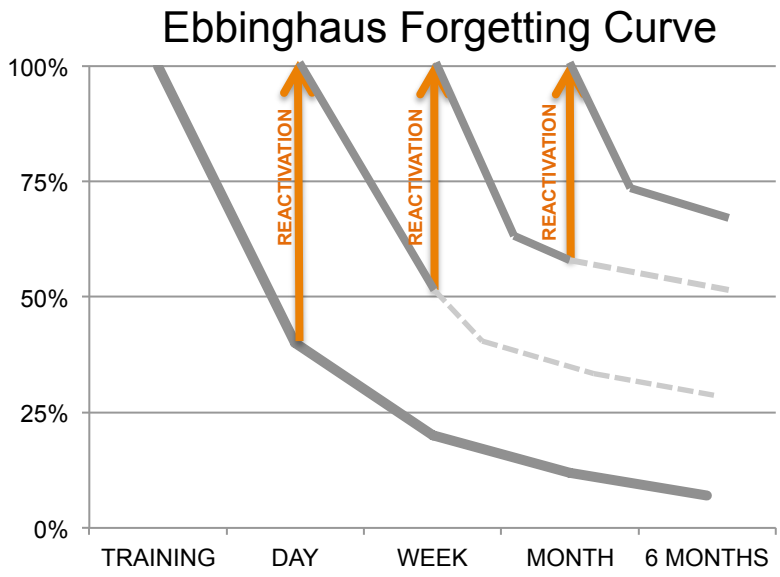
Individualized Curriculum Based On Learner's Performance, and Set Threshold



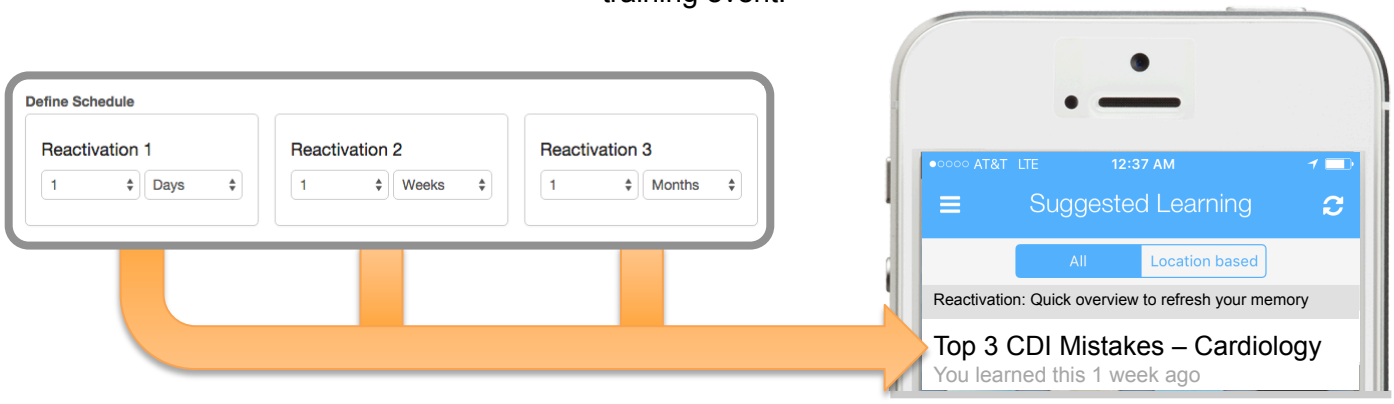
About ImplementHIT

Reactivation = Retention

Herman Ebbinghaus (1850-1909) was a pioneer in bringing higher mental processes into the experimental laboratory and thus helped establish psychology as a science.[S2] Ebbinghaus established the now-classic forgetting curve, which shows that forgetting proceeds very rapidly at first and then more slowly as the time from the learning increases.[D1] For example, he determined that the adult brain will lose up to 75% of all information taught within 1 week.[I1] Ebbinghaus demonstrated that review at specific intervals (10 minutes, 1 day, 1 week, and 1 month) enables adult learners to effectively retain new concepts in long-term memory. Repeated exposure at these four intervals staves off memory degradation. In other words, Reactivation = Retention.[I1]



Relate required E-Learning with an OptiQuery Solution, and the system will automatically prompt each individual learner to reactivate learning conveniently via mobile, at the optimal intervals after the initial training event.



About ImplementHIT

ImplementHIT and Tin Can xAPI

Over 60% of learning at an organization typically occurs outside of the Learner Management System (LMS). TinCan API (sometimes known as the Experience API or xAPI) is a specification for how to collect this learning and experience data that is often overlooked. xAPI was developed by the Advanced Distributed Learning initiative (ADL, creators of SCORM) and went live in 2013. As of January 2016 the ImplementHIT training platform is the only healthcare focused learner management system that is Tin Can compliant (we are also SCORM compliant).

SCORM vs Tin Can xAPI

You are probably already using a specification like SCORM to track some learning data, and ImplementHIT is SCORM compliant as well. However, the Tin Can xAPI has a number of advantages over the traditional SCORM method of tracking and recording physician learning activity, most notably Tin Can's ability to record any type of learning activity whenever and wherever it takes place.

SCORM	Tracking of	Tin Can xAPI
Yes	Completions	Yes
Yes	Timings	Yes
Yes	Pass / Fail	Yes
Yes	Single Scores	Yes
	Simulations	Yes
	Informal Learning	Yes
	Real-world Performance	Yes
	Offline Learning	Yes
	Interactive Learning	Yes
	Adaptive Learning	Yes
	Blended Learning	Yes
	Long-Term Learning	Yes
	Team-Based Learning	Yes

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