

Developing Skills in Intra-Workplace Rehabilitation Education: II

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Abstract

This study aimed to develop an educational model that integrates three elements: knowledge, skills, and attitudes—developing the educational model proposed in the previous Paper I—and to widely investigate and characterize previous learning-related models. The basic educational model proposed here is my seven-step process model of rehabilitation practice. *Knowledge* consists of four aspects: 1) clinical, 2) psychological, 3) environmental, and 4) disability; *skills* consist of two steps: 5) identifying intervention points and 6) setting feasible goals; and *attitudes* 7) of communicating and sharing policies and paths with patients, families, and other professionals. This constitutes the process of rehabilitation practice, and a framework that integrates the three elements is developed here. This study focuses on integrating knowledge, skills, and attitudes into what Bloom described as “the integration of instruction and assessment” so that learners and instructors can reconcile them. Therefore, a typology that explains each other for advancing and deepening individual skills is adopted. In Bloom’s original taxonomy of educational goals, the cognitive domain has five layers in the pyramid of knowledge; the psychomotor domain of Simpson’s has seven layers, and Bloom’s affective domain is represented by five in another pyramid. In addition, the above seven layers of the process model and the seven layers of the skill level of the Dreyfus model were brought together. The integration of the above five typologies becomes a useful educational evaluation model when the relationships are clarified.

Keywords

Japanese Rehabilitation Education, Dreyfus, Bloom and Simpson’s Taxonomies, Cruess’s Rehabilitation Skills, The DOES, EPA and DOPS

1. Introduction

1.1. To Develop a Conceptual Framework

This paper serves as a continuation of Paper 1, with the same departure points; Firstly,

Conceptual frameworks [in medical education] represent ways of thinking about a problem or a study, or ways of representing how complex things work. They can come from theories, models or best practices. Conceptual frameworks illuminate and magnify one's work. Different frameworks will emphasize different variables and outcomes, and their interrelatedness [1] (p. 312).

Secondly, throughout Papers I and II, a key underlying educational model is the use of Takanashi's [2] pyramid of knowledge [3] [4] [5] [6] [7]. According to Takanashi, knowledge management (KM) is "a systematic approach to finding, understanding, sharing, or creating and utilizing value-creating knowledge in order to achieve organizational goals and objectives" [2]. This definition is also consistent with the process of rehabilitation practice at the organizational (or departmental) level, for example, in the promotion of team healthcare, and it is recommended that a knowledge management (KM) approach be applied [8] [9] [10]. The model is presented visually in Paper I and reproduced here [3]. (See **Figure 1**)

Thirdly, this study aimed to develop a sound framework which illustrates a convenient means of understanding the concepts and a clear depiction of how existing constructs are linked. The approach for this study can be as a starting point in the conceptual paper described below.

Studies suggested that there are four main types of research design in conceptual papers: 1) theory synthesis, 2) theory adaptation, 3) typology, and 4) model [11]. *Theory synthesis* refers to the conceptual integration across multiple theoretical perspectives. *Theory adaptation*, on the other hand, refers to revising the scope of perspective of an existing theory by informing it with other theories. *Typology* aims to explain differences between variants of a concept. And lastly, the *model* aims to build a theoretical framework that predicts relationships between constructs [12].

1.2. Developing Clinical Competence

In recent years, as new physical therapists who were restricted from clinical practice due to the COVID-19 pandemic have now entered the workforce, there is an urgent need for professional education that fosters a rehabilitative *mindset* through some form of clinical practice [3] [13] [14]. There is also a need for physical and occupational therapist education that fosters the knowledge, skills, and attitudes necessary for the practice of rehabilitation medicine [14] [15] [16]: these three concepts come from competency-based education [3]. This Western concept is starting to be accepted in Japan; it is essential to shift from a focus on

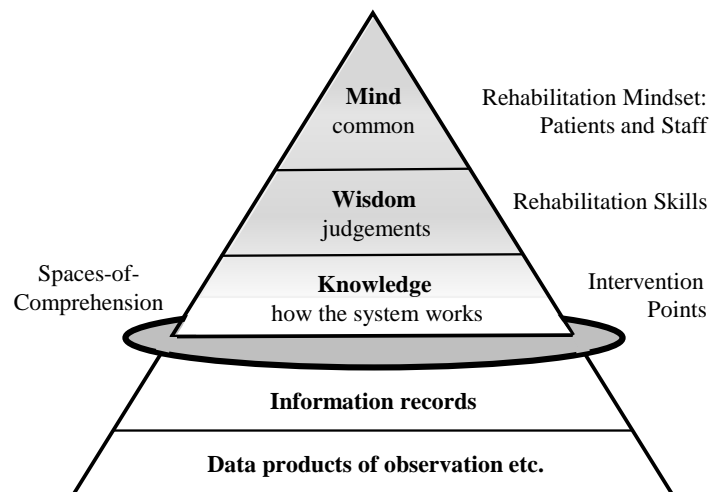


Figure 1. Educational model to foster “Knowledge” from practice knowledge model.

knowledge and techniques in summative undergraduate education to the rather different postgraduate education that fosters formative connections among learning elements such as a range of cognitive, psychomotor, and affective skills (e.g., the extended tripartite of Bloom’s taxonomy of skills [17] [18] [19] [20] [21]).

What view of competence are we working with? [22] Knowledge, skills or attitudes that enable one to effectively perform the activities of a given occupation to the standards expected in that profession. Competencies describe the “decisive” way in which the competence was carried out and are short and generalized expressions of complex effort and resourcefulness [23]. The competencies for a given occupation are divided into Domains of Work, and the decisive competencies within each Domain are listed. The competencies are further subdivided into Performance Statements that support the execution of each competency [24]. Job-related behaviors narrow down related knowledge, skills, and attitudes [25]. (See **Table 1**)

The World Body of Physiotherapists [26] is very clear that the development, as well as evaluation, should be in terms of competence: perhaps this is because the discipline can be broken down into parts which the student and tutor can look at together. The contribution in this paper is the presentation of psychomotor skills, the more “correct” presentation of learning objectives, and the presentation of a list of the affective skills in the Appendix. (See **Appendix 1**)

1.3. Methods of Assessing Clinical Competence

In Miller’s (1990) [27] well-known triangle in the authenticity of clinical assessment there are four levels from base to peak: “Knows”, “Knows How”, “Shows How”, and “Does”. “Knows” and “Knows How” require written examination. “Shows How” requires a Competency-Based Assessment, the Objective Structured Clinical Examination (OSCE) and “Does” requires Workplace-Based Assessment. (See **Figure 4**)

Table 1. Elements of competence.

Cognitive	Psychomotor	Affective
knowledge	skills	attitudes
ways of thinking	ways of proceeding	ways of communicating

DOES mini-CEX (Mini Clinical Evaluation Exercise), for example, is widely used in rehabilitation medicine and has been reported in many studies [28] [29]. Here our focus is on the Direct Observation of Procedural Skills (DOPS), another form of assessment of clinical competence [30]-[40].

So, an ongoing focus on EPAs (Entrustable Professional Activities) can be useful for in-workplace education if they are patient-centered [41]-[49]. Therefore, we shift our perspective to workplace-based education and learners' skills education.

The concept of formative evaluation, which aims to realize goals by conducting evaluation midway through the learning process and modifying subsequent instruction accordingly, is the same as the goal of "integration of instruction and assessment".

1.4. Summary of Paper I

In Paper I, I proposed an educational model that integrates knowledge, skills, and attitudes to develop rehabilitation professionals. This was the basis of a theoretical educational model regarding the step-by-step procedures in the practice process necessary for rehabilitation in workplace education. In particular, I proposed a Japanese educational model that conveys knowledge and skills through reflection and deep thinking about experienced cases. (See **Figure 1**)

Knowledge is the process of understanding the patient's situation as a whole and recognizing specific challenges that emerge. Here the DIKW (Data-Information-Knowledge-Wisdom) model is helpful. (See **Figure 2**) Awareness of "valuable information" becomes knowledge through information gathering, listening, and observing in the situation. The author believes that providing learners with the opportunity to develop this awareness is the foundation of clinical education.

On the other hand, rehabilitation skills provide achievable goals and pathways for the patient's family from multidisciplinary professionals. Intervention points of what to do in the here and now become the wisdom and skills of "knowledge leading to behavior". The author believes that the "knowledge mind" of the rehabilitation mind could be developed by cultivating knowledge of valuable information and the wisdom of knowledge that leads to behavior.

Chi-shin's ("intellectual mind") professionalism does not only deal with the clinical features, such as diseases and symptoms, but also deals with the individual's functional impairment features, and the reconstruction of life as a whole in context. (See **Table 2**)

"Knowledge" consists of knowledge (informational knowledge: Chi-shiki), wisdom (behavioral knowledge: Chi-e), and awareness (conscious knowledge:

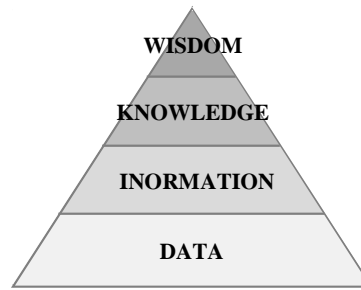


Figure 2. The DIKW pyramid (source unattributed).

Table 2. Seven clinical steps for rehabilitation* (Knowledge, Attitudes and Skills: Own Work).

1. Clinical Features	<p>Understanding of patient illness and medical conditions and information about the processes of medical treatment.</p> <p>Knowing changes to current conditions and acute phase treatment information.</p>
2. Psychological Aspects	<p>Knowing the specificity of mental, psychological, intellectual, motivation, etc.</p> <p>Knowing differences between pre-illness life and lifestyle habits and current conditions, etc. and current prognosis, and ongoing prognosis.</p>
3. Environmental Aspects	<p>Know the living environment-related human, material, and institutional information.</p> <p>Knowing family wishes and requests, such as transfer or discharge destination, nursing circumstances, etc.</p>
4. Functional Impairment Features	<p>Awareness of the disability characteristics of the physically active and motor functions, and the characteristics which are strengths.</p> <p>Realizing the possibility of improvement in patient activity ability and functional recovery, etc.</p>
5. Issue Identification	<p>The possibility of recovery and improvement is found, and what should be done in the current situation and the action directions (intervention points) to resolve the problem as soon as possible and as a priority are understandable. The best approach, which is the key to success, is found after practical trial and error.</p>
6. Goal Setting	<p>Able to set weekly milestones and practice tasks that can be achieved immediately, after one month and at the time of discharge from the hospital. To be able to reason about the realization of goal setting with rationale based on the progress of the process.</p>
7. Communication	<p>Propose and communicate to the patient’s family the path and process for the patient’s life after discharge from the hospital. Share the purpose of rehabilitation (what for), goals (what to achieve by when), and strategies (how to achieve the goals) with multiple staff members.</p>

*This will be compared with the psychomotor skills below.

Chi-shin). The possibility of developing professional human resources is suggested by using an educational model that integrates these three elements: knowledge for diagnosis of the whole situation, wisdom to put new behavior into practice, and an appropriate hospitality awareness of people with disabilities (also called hospitality of the heart).

1.5. Development in Paper II

In Paper I, I introduced educational competence in which cognitive, psychomotor, and affective aspects are connected through case studies. Paper II develops a learner-centered method from an educator—and patient-centered perspective. Specifically, the keywords of knowledge, skills, and attitudes may be regarded as “ways of thinking, proceeding, and communicating”. (See **Table 1**)

In my model of rehabilitation education for learners (See **Table 2**), knowledge is a fourfold concept [3] [4] emanating in a holistic view of the patient’s situation: this includes Clinical Features, Psychological Aspects, Environmental Aspects, and Functional Impairment Features. The *skill* is a way of finding intervention points and demonstrating feasible goals and paths to patients, their families, and various other professionals [5] [6]. The *attitude* consists of communicating the holistic situation to one’s patients. The procedures and steps of this practical process are positioned as rehabilitation skills [10] [13]. This may be exemplified in Shared Decision Making (dealt with in Paper I).

I have further developed a conceptual framework that demonstrates how to “think”, “proceed”, and “communicate” in rehabilitation medicine in practice. The knowledge model is a “way of thinking” as a holistic view of intervention points as valuable information from the four aspects of individual rehabilitation assessment. The skills model is a “way of proceeding” from Simpson’s pyramid [19] of psychomotor skills development to the rehabilitation practice process as a step-by-step procedure through seven steps. (See **Table 1**, **Table 2**)

Therefore, the competence curriculum for physical and occupational therapist education in Japan may be considered through the lenses of the three domains, with knowledge and skills learned in on-campus education, and skills and attitudes learned in off-campus intra-hospital clinical training.

After an extensive survey of previous learning-related models, Anderson’s Dimensions of Knowledge linking knowledge and skills [20], and skills development, Dreyfus [50] [51], and EPA [41]-[49], and DOSE in the Miller pyramid, DOPS [30]-[40] of the Miller Pyramid [27], and attitude “IS” in the Cruess Pyramid [52] [53] will be the applicable framework, which will be discussed in detail below.

1.6. Purpose of This Paper

1) The larger study aimed to develop an educational model that integrates knowledge, skills, and attitudes—developing the educational model proposed in the previous Paper I—and to widely investigate and characterize current widely

accepted models.

2) One of key aims is to get novice students to move from their summative college learning into formative intra-workplace learning.

2. Specific Foci

2.1. Psychomotor Domain

Taxonomies: Bloom & Anderson

In the original work on taxonomies in the late 1950s (Bloom, *et al.*, 1956) [17] [18], three domains were decided on: the cognitive, the affective and the psychomotor, but in 1964 the larger committee felt that there was little call for the last domain in schools and colleges, but it had already been fully developed and was stored away. It has relevance to physical therapy. Here is the set, with explanatory verbs supplied. (See **Figure 3**: read from the bottom up.)

A close review of the literature reveals that Bloom's theory has been misrepresented or misunderstood all this time. Twelve different types of knowledge were identified. Anderson and Krathwohl (2017) [20], early colleagues of Bloom, point out that the model was never supposed to be a pyramid. Knowledge dimensions underpin everything else, and there was no hierarchy, just tools; for example, so you could use evaluation to conduct an analysis, or increase your understanding when making an application. I have also taken the liberty of splitting memory in the table below to show that it is increased if you bring to mind both recognition and recall of what you already know. Knowledge is split away from the rest of cognition. (See **Table 3**)

Once the educator has mastered the table, any task, problem or project given to a class or learner may be described by ticks in the relevant boxes. While we don't expect learners to master the whole table, we could track their progress on a task or problem using the table or simply the labels, for example:

- 1) D-Procedural—analyzing—applying—metacognition—creating
- 2) A-Factual—general understanding—D-Procedural—evaluating—organizing
- 3) C-Principles—applying—evaluating—creating—metacognition

Keywords

7. **ORIGINATION** : originates, arranges, builds, combines, composes, constructs, creates, designs, initiate, makes.

6. **ADAPTATION** : to meet the need, adapts, reproduces, responds.

5. **COMPLEX OVERT RESPONSE** : The Key Words are the same as Mechanism (4) but will have adverbs or adjectives that indicate that the performance is quicker, better, more accurate, etc. quicker, better, accurate, assembles, calibrates, constructs, dismantles, displays.

4. **MECHANISM** : repairs, heals, organizes, copies, traces, follows, reacts, reproduces, responds.

3. **GUIDE RESPONSE** : responds, copies, traces, follows, reacts, reproduces.

2. **SET** : reacts, adapts, begins, displays, explains, moves, proceeds, shows, states, volunteers.

1. **PERCEPTION** : describes, identifies, chooses, detects, differentiates, distinguishes, isolates, relates, selects.

Figure 3. Simpson's (1972) [19] taxonomy of psychomotor performance a La Bloom, with key verbs. (Wikipedia)

Table 3. Knowledge and cognitive dimensions of Bloom’s taxonomy as rectified by Anderson.

Knowledge dimensions*	The cognitive process dimensions								
	Facts remembering	Generatives remembering	Understanding**	Analysing	Organizing	Applying	Evaluating	Creating	Metacognition***
A. Factual									
B. Conceptual									
C. Principles									
D. Procedural									

Knowledge Dimension:** **A.** Factual Knowledge—The basic elements that students must know to be acquainted with a discipline or solve problems in it; **B.** Conceptual Knowledge—The interrelationships among the basic elements within a larger structure that enable them to function together; **C.** Principles Knowledge—How to do something; methods of inquiry, and criteria for using skills, algorithms, techniques, and methods; **D.** Procedural Knowledge—The knowledge exercised in the performance of some task. *3. Understanding:** 2.1 Interpreting 2.2 Exemplifying 2.3 Classifying 2.4 Summarizing 2.5 Inferring 2.6 Comparing 2.7 Explaining. *****9. Metacognition:** Thinking about thinking; reflecting, planning, skills. NOTE: It should be clear that *cognition* is of a different type and order to *knowledge*. A rule of thumb might be that psychologists deal with cognition (thinking) and philosophers don’t; a branch of philosophy dealing with knowledge is called epistemology.

In “A Revision of Bloom’s Taxonomy of Educational Objectives”, the cognitive component in 2001, the focus at the beginning is almost identical to the one we drew up.

It is not my intention to rehearse the familiar pyramid here, but to look at its interesting origins and its partner typologies. Anderson (2017) [20] referred readers to an excellent review and development of one of her early co-workers Krathwohl (2002) [21] which seems to have settled into being the state of the art in 2015 of cognitive objectives; however, that model is too complex for use in the rehabilitation-education context.

2.2. Simpson’s Model: Seven Psychomotor Skills

This diagram does not seem to have appeared in any educational-psychological textbooks. Nor does Simpson’s model [19] (Table 4), for that matter, which is useful in our context. (See Figure 3)

Level 1 is a parallel of the first category of receiving or attending. This is an essential first step in performing a motor act. It is the process of becoming aware of objects, qualities, or relations by way of the sense organs. It is the central portion of the situation—interpretation—action chain leading to purposeful motor activity. It may be divided into three subcategories indicating three different levels in the perception process. (See Table 4)

Table 4. Seven areas of Simpson’s skills; seven stages of the rehabilitation practice process; Dreyfus learning levels.

Seven Skills Simpson [19]	Clinical Model- Rehabilitation Practice Process Hiragami	Dreyfus and Dreyfus [50] Learning Levels
1. Perception: awareness, sensory cues	1. Clinical Features	1. Student
2. Set: mental, emotional sets	2. Psychological Aspects	2. Novice
3. Guided Response: trial and error, adequacy	3. Environmental Aspects	3. Advanced Beginner
4. Mechanism: basic proficiency	4. Functional Impairment Features	4. Competence
5. Complex Overt Response: expert, skilful performance	5. Issue Identification	5. Proficient
6. Adaptation: well-developed	6. Goal Setting	6. Expert
7. Origination: highly developed skills	7. Communication	7. Master

1) Let us say that Psychomotor works in real time: then I think this could work in Levels 1 - 3 while the student orients to new knowledge or skill. Then 4 & 5 work together. Lastly 6. 2) I think this will show the difference between student (pre-graduation) and entry level (post-graduation). The boundary between 4 and 5 may be the difference between a complete career.

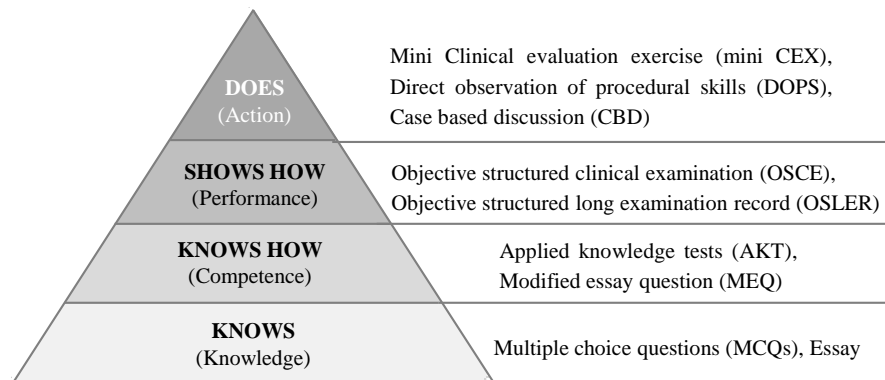


Figure 4. Framework for clinical assessment. Miller p. 563 [27].

It is clear that the general or even specific work of the trainee physical therapist is not going to be broken down into such small subcategories; rather, the analysis above serves to show that the psychomotor domain is extremely complex and important for such procedures. Development of these skills requires practice and is measured in terms of speed, precision, distance, procedures, or techniques in execution. In research, one could use these seven points as a perspective for evaluation; one could even create a checklist to self-assess the reports of the cases one has experienced. It must be noted that the Simpson gradient does not match my clinical model in 1-1 fashion; this is because the clinical model takes cognizance of aspects of the whole situation and consequently cannot be simplified.

We posit that the educational model prototyped here could be matched with the seven categories of psychomotor performance [19]. In other words, that each of the seven categories may be the departure point of seven evaluations. With “understanding the complete situation” here, information may be divided into four quadrants, and then differentiated and characterized; doing so leads to a concrete and unique patient profile. For the medical staff information is extracted from the clinical situation and disability/injury circumstances, whereas for the patient and family-side information is detailed in psychological and environmental aspects; a care model has been developed that uses these keywords and phrases in the four levels. (See **Table 2**)

Disability/injury circumstances have their own special characteristics; there are always points of strength to be discovered and these are essential for seeing a way through the disability/injury circumstances. Additionally, when we take into account the four dimensions, of the care model a better understanding of the patient’s complete situation is revealed. There is 1) also strength here if the situation should change; 2) there are intervention points; finally, 3) there are pointers of what would be positive to do which might lead to 4), changes in awareness and action. This model is something the new physical therapist will be inducted into over time. She or he will be inducted by a more senior therapist or a different member of the team. What follows now is a brief introduction to the skills the junior members of the team will be inducted into over time.

3. Clinical Skill Development

3.1. Dreyfus and Dreyfus

Dreyfus and Dreyfus’ model (1980) [50], developed a five-stage model of the mental activities involved in directed skill acquisition, from *Novice* to *Competent*, *Proficient*, *Expert*, and *Master*. While there has been a favorable response to this set of propositions, it is based on phenomenology, and many in the medical field are objectivist-realist in their theory of knowledge (e.g., Peña, 2010) [51]. However, it accords more with a Japanese epistemology. (See **Table 5**)

The Dreyfus’ model may partially explain the “acquisition” of some skills, but

Table 5. Six-stage model of the mental activities (Dreyfus Versus Bloom).

<u>Skill Level</u>	Novice	Advanced Beginner	Competence	Proficient	Expert	Master
Mental Function						
Recollection	Non-situational	Situational	Overview			
Recognition	Decomposed		Holistic			
Decision	Analytical			Intuitive, teacher		
Awareness	Monitoring				Absorbed, awareness of features and intervention points	
Reflection	Non-reflective					Reflection in and on action

it is debatable if it can explain the acquisition of clinical skills. The complex nature of clinical problem-solving skills and the rich interplay between the implicit and explicit forms of knowledge must be taken into consideration when we want to explain the “acquisition” of clinical skills. The idea that experts and masters work from intuition, not from reason, should be approached cautiously—this may happen only from time to time.

The authors’ awareness is partly “intuitive” in a sense, but in reality, it is based on a constant process of checking and verifying. This is carried out by a “reflective practitioner”. The author also doubts that only skills are taken up for evaluation: knowledge is too; this is because we believe that skills are based on knowledge gained from actual patient information.

On the other hand, it is interesting to note that Dreyfus’ six-stage model emphasizes developmental stages at the skill level. The differences in each of the five levels are generally rated according to the following keyword skills (Carraccio, *et al.*, 2008) [41]. A six-level model has *beginner, advanced beginner, competent, proficient, expert, master, and awareness*. To “awareness” is added “reflection”.

Carraccio, *et al.* (2008) [41] incorporated advanced beginner (in training) between novice and competent, indicating that the newcomer education stage does not immediately lead to independence (competence). Certain responsibilities are given only after a medical certificate has been achieved and usually close to two years of clinical experience. However, therapists are not actually aware of such a system, which makes in-work education extremely important. Therefore, it would be good to introduce the concept of Entrustable Professional Activities (EPA) as described below at the level where a person can stand on their own two feet without supervision—*i.e.*, be competent. [42]

3.2. Competence & Entrustable Professional Activities (EPA)

Given Bloom’s taxonomy, we might have expected a *medical* taxonomy to be developed; but this appears not to have happened. But EPAs represent a unit of professional practice that can be entrusted to a sufficiently competent learner or professional who has proficiency in multiple competencies simultaneously [41]-[49]. The concept was first developed in 2005 and is thus fairly new; however, there has been a great deal of teamwork developing for example a whole compendium of 13 EPAs in the US [42]. One review of thirteen papers came up with themes that are relevant to our holism concept, although we cannot find work on rehabilitation as such. The five themes are as follows ([45], p. 1413):

Capability (specific knowledge, skills, experience, situational awareness), Integrity (truthful, benevolent, patient-centered), Reliability (conscientious, predictable, accountable, responsible), Humility (recognizes limits, asks for help, receptive to feedback), Agency (proactive toward work, team, safety, personal development).

Making entrustment decisions differs from systematic assessment of trainees

(students), which usually has no import beyond tracking trainee progress. Clinicians generally *weigh more factors* in making an entrustment decision than when merely assessing trainee competence that has no direct consequences for patient care [45].

In putting the patient firmly in the middle of the frame, we marry educational and health care and educational responsibilities; building trust early on may re-frame our vision of assessment in the workplace. If we decide to grant autonomy on a selected level of supervision appears to align health care practice better than most current assessment practices; it speaks to authenticity [46]. There is quantifiable value in establishing EPAs that standardize professional competence expectations at different points along the professional continuum.

The learner at specific levels is routinely able to gather an accurate complete history and can also gather a focused history in an urgent, emergent, or consultation setting. The entrustable learner can perform an accurate complete physical exam or a focused physical exam pertinent to the patient visit, identify and document abnormal findings, and describe such findings to team members. For the entrustable learner, analytic reasoning and the ability to activate prior foundational knowledge and prior clinical experience underlie the choice type of history and physical exam and guide the gathering of information relevant to the patient's care. The learner consistently uses patient-centered interview skills and physical exam techniques that demonstrate respect for patients, insight about patients' emotional responses, sensitivity toward each patient's unique background and needs, and the ability to communicate bidirectionally [42]-[49].

3.3. Miller's Pyramid

The DOPS

DOPS [30]-[40] is a formative or summative assessment method designed by the Royal Medical College (England) for assessing clinical skills. Using a pre-prepared observation schedule, the examiner observes the trainee doing a routine procedure on a real patient in a real situation, giving feedback to the trainee and having a discussion about the assessment afterward. This assessment method has an important role in learning clinical skills and can be used at all levels of medical education; however, there appears to be no reported use in rehabilitation medicine. "In the reviewed literature [34], DOPS was found to be a useful tool for assessment of procedural skills, but further research is required to prove its utility as a workplace-based assessment instrument." [33] In another study, DOPS was found to be a practical and reliable test with acceptable validity which can be used to assess clinical skills of undergraduate medical students [35]. However elsewhere, not providing necessary training on how to take a DOPS test, not providing essential feedback to participants, and inadequate time for the test were found to be the major drawbacks of the DOPS tests used [36]. There is a thorough practical description from Singapore [37]. However, DOPS may help students to identify their areas of weakness, to improve performance and thereby

encourage a deep approach to learning when compared with MCQ [38]. In a slightly different application, student nurses were given a DOPS on a particular skill three times, and it was found that it had a learning aspect as well as an assessment skill aspect [39].

One of the chief concerns of this paper is formative intra-workplace evaluation of skills. Let us assume that even a new physical therapist already has several skills under their belt, in the language of the pyramid above, they “Know” and “Know How” several things. Later on in the first year, they will get to “Show how”, and “Does”. There are seven possible types of assessment using this method. The tutor may hold a case-based discussion but for our purposes, this is the place for DOPS.

One criticism that may be levelled at DOPS is that they could be a box-ticking exercise. It may be that DOPS covers a whole range of professional competencies such as clinical reasoning and communication skills, which would have to be compared to skills on the ward for example. Students also score more highly on written exams than on the equivalent DOPS. If one looks at available DOPS paper schedules we can see that they are not simply a box ticking exercise; there is a place for discussion between trainer and trainee, and the latter can leave a written response to the evaluation.

The relationship between DOPS and the educational model prototyped in this study is as follows. So far, DOPS evaluation has been applied in various medical fields, but this is the first suggestion for its use in rehabilitation medicine. The DOPS evaluation in this study has a unique point. We believe in the value of evaluating the teaching procedure from seven perspectives of my model. These consist of 1) clinical features, 2) psychological aspects, 3) environmental aspects, 4) functional impairment features, 5) issue extraction, 6) setting goals, and 7) communication stages. There are steps in the process that encourage “awareness”. From this, reflection promotes insight.

However, the conclusion of the case report should be complete with a description of how the goals agreed upon with the patient’s family were achieved and how they impacted and changed the patient’s follow-up life. This is difficult to achieve in practice because the outcome occurs several months after the patient has completed rehabilitative care and has been discharged from the hospital. Here, we keep to a series of concurrent thought processes.

“Learning” refers to awareness and actions changing due to experience. “Learning strategy” refers to an intentional method for learning effectively and indicates the following three approaches. Now that skill-related in-work training has been described in detail, a framework leading to attitudes will be described at the end of this section.

3.4. Cruess’s Pyramid

3.4.1. The IS level

The knowledge base gives some assurance that a student, a resident, or a physician knows what is required to carry out those professional functions effectively.

More recently senior professionals have felt that their experience should somehow be acknowledged at a higher level than “Does”. A fifth level at the tip of the pyramid is proposed; this would be “Is”, reflecting the existence of their professional identity. (See **Figure 5**)

It is important once again to note that this pyramid is fluid, not set. During the course of one’s professional training, new information keeps filtering into the “Knows” section and moves upward, until perhaps we are talking about a specialist surgeon, who has their own largely implicit level of knowing.

3.4.2. Rehab Mind

Even if any educator attempts to teach and evaluate only professionalism, teaching is difficult, and evaluation is even more difficult. Therefore, it is necessary for educators who are at least at the Expert or Master level to present learners with documentation of the practice process through *a series of cases*. How the learner tries to incorporate this information will then be their own concern. The reasons are as follows:

- 1) The salient problem in the field is that skills that have not been taught are used to evaluate clinical competence.
- 2) Similarly, because the cases experienced vary from institution to institution and from learner to learner, there is not a standardized set of skills for treating each patient.
- 3) In the evaluation of learners, clinical skill evaluation based on years of experience may not initially make sense to learners.
- 4) It would be appropriate to communicate to the patient’s family and to multiple professionals why skills must be demonstrated for the benefit of the individual patient and junior therapists.

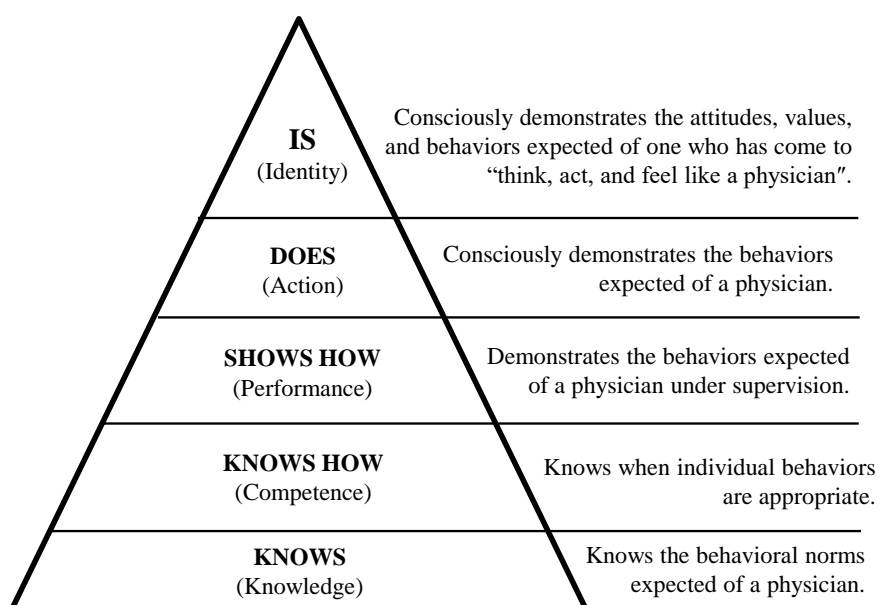


Figure 5. Revised framework for clinical assessment with example of physician (Crues, *et al.*, 2015, 2016) [52] [53].

Therefore, educators themselves will present case scenarios in which they have reflected on their own experiences, thought about them critically, gained awareness of them, and applied them to new actions in novel situations. The significance of the demonstration pedagogy lies in the fact that the learners who observe it learn what contemplation and awareness look like, and the demonstration pedagogy triggers *contemplation* and *awareness* in the learners themselves.

4. The Role of Learning Typologies

4.1. Methods of Learning That Lead from Pre- to Post-Graduate Education

There are three transitions that lead to post-graduate training.

4.1.1. Underlap

First, there is an overemphasis in undergraduate training on knowledge and techniques focused on the national (college/university) examinations, where there are sharp differences in “studies” in college education and “learning” in clinical/hospital education, and ironically—from a transition from summative to formative evaluation. There is a need to construct innovative methods of learning that transition from specialist academic knowledge to knowledge directly and immediately useful for patients, as well as from assessment and medical treatment techniques to practical methods and process skills. The key phrase linking undergraduate education and postgraduate education would be the development of “rehabilitation skills”—in the deeper Japanese meaning. In the meanwhile, there should be a mentorship program in the hospitals where senior therapists assist the novices.

With knowledge, what is realized in “rehabilitation information” is valuable evaluation. In evaluation lies the value. Evaluation is finding value and realizing key points of intervention. One can realize, understand, and be able to execute what should be done in rehabilitation. In short, if the therapist has rehabilitation skills, the body will naturally move. When the wisdom of knowledge leading to behavior is acquired, the therapist’s manner of interaction fits the patient the best; a method of learning where this is conveyed must be developed.

4.1.2. Improving Clinical Reasoning

Clinical reasoning is a patient-focused thinking process where pathological conditions are diagnosed based on patient complaints and clinical picture, and the optimum intervention is selected. “Clinical reasoning” refers to process-oriented achievable goals, after understanding the patient’s complete situation, to extract the maximum amount of residual function. In reality, it is making judgments, while thinking as the therapy proceeds, with an imaginative and creative trial-and-error approach which constitutes clinical reasoning ability on a range cases. This results in self-driven learning on the part of the clinician.

4.1.3. Developing a Team Model

Developing a team of medical care able to provide the rehabilitation which is

truly necessary for patients, requires sympathetic thinking and relationships of mutual trust. For this, developing a common language incorporating the thinking, judgment, and expression processes is imperative. This leads to learning that fosters improvements in the way one thinks of the patient's situation, how one judges the independent support and prognosis, and how policy and goals are communicated.

The "Chi of Ba" is a team wellness meeting of heterogeneous people who understand each other's professional profiles and understand that they are complementary to each other. Each case report created becomes a valued asset. The authors of those case reports will challenge themselves to create even higher quality case reports. Those who read them will be able to reflect on their own cases.

Finally, the role of rehabilitation medicine is becoming increasingly important in Japan, the world's most hyper-aged society. The hospital has to contribute "knowledge" and "practice" for the well-being of elderly people with disabilities and the people who support them. In order to contribute to the community, a hospital must be a place that develops professionals in the knowledge and practice of rehabilitation medicine. Human resource development of rehabilitation professionals is essential not only at the individual level but also at the organizational level and at the hospital level as a whole. Papers I and II begin to inform a new method for rehabilitation education in the workplace.

5. Narrative Issues

Manabu Sato [54] defines learning practice as the practice of constructing meaning and reconstructing relationships through narratives about the subject, self, and others. This definition seems to be common to the learning of rehabilitation practice. Learning rehabilitation skills is also the practice of constructing meaning and rebuilding relationships through narratives about the subject, self, and others. The subject is the patient, the self is a rehabilitation professional, and the others are the patient's family members and other professionals; the practice of re-constructing meaning and relationships is an activity to express and share the value and role of being involved with the patient as a professional with rehabilitation skills.

To put this definition into practice in rehabilitation, the question becomes how to structure the narrative and have it expressed and shared. As a concrete method, a frame to express the thinking activity is necessary. The elements that constitute this framework are (1) through (7), and their concepts have been discussed in Papers I and II (**Table 2**). In Paper III, Practical Application, the framework is divided into three parts: problem recognition, response on the day (intervention points), and review three days later (best practices). We thought that by incorporating practical cases into this framework, case scenarios for simulation education could be used as teaching materials.

6. Summary of Conclusions

"Learning goals" refers to a declaration of what one wishes learners to be able to

do and is clarified through the following two points. It looks like the Learning Goals described in Paper I are “Competent” at the Individual level of skills, are “Proficient” at the “Organizational level”, and “Expert or Master level” at the “Overall hospital level”.

6.1. Innovations in Evaluation

Competences and issues are subdivided into the following categories:

1) *Knowledge* will benefit from including the “perspective of EPA in the concept” as the opportunity for the senior to watch juniors assess patients.

2) For *skills*, Simpson’s pyramid in the psychomotor domain is a way to proceed with rehabilitation skills. In addition, there is a novelty if the DOPS in the DOES of the Cruess’s Pyramid is used to advance rehabilitation skills.

3) *Attitudes* would be enhanced if it communicates identity “to think, act, and feel like an expert” in the IS at the top of the clinical evaluation pyramid. Otherwise, we need to fall back on Bloom’s model of affect, which has its own set of virtues.

It is expected that the accumulation of case scenarios and their typical attributes will contribute to a library of demonstration diagnoses by introducing the perspectives of EPA for the way of thinking, DOPS for the way of proceeding, and IS for the way of communicating. All these will contribute to novice learning and development.

6.2. Holism in Assessment

The larger study aimed to develop an educational model that integrates knowledge, skills, and attitudes—developing the educational model proposed in the previous Paper I—and to widely investigate and characterize current widely accepted models.

The basic educational model proposed here was aligned with my seven-step process model of rehabilitation practice. *Knowledge* consists of four aspects: 1) clinical, 2) psychological, 3) environmental, and 4) disability; *skills* consist of two steps: 5) identifying intervention points and 6) setting feasible goals; and *attitudes* 7) of communicating and sharing policies and paths with patients, families, and other professionals. This constitutes the process of rehabilitation practice, about I wish to take further, bearing in mind that we want to incorporate team, hospital and management dynamics holistically. One review [13] [14] [31] I report again shows the common denominators of EPA:

Capability (specific knowledge, skills, experience, situational awareness), Integrity (truthful, benevolent, patient-centered), Reliability (conscientious, predictable, accountable, responsible), Humility (recognizes limits, asks for help, receptive to feedback), Agency (proactive toward work, team, safety, personal development).

If we look at capability, integrity, reliability, humility, and agency we look at a

Western view, but at the same time, these are characteristics which constitute Japanese humility skills.

One of key aims is to get novice students to move from their summative college learning into formative intra-workplace learning. To Introduction

7. Conclusion

In order to developing their skills through intra-workplace rehabilitation education need to be integrated into the life of the hospital by *working alongside their seniors* in the first place by the use of DOPS. This is a negotiated assessment which allows the student to clarify what has worked and what has not. Then later, as they enter residency, students will be assessed by EPA, and have stepwise opportunities to demonstrate how autonomous they may be in carrying out about 13 procedures. The use of DOPS and EPA constitute an opportunity to build a community; this the physiatrists must do for themselves as there is no research on this. However, many instances are carried out to generate a store of case studies, and these constitute an important store of case studies from which students may learn. The case studies can be recycled many times. It is not only people who mediate to students; it is also written forms that do this.

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Conflicts of Interest

The author declares no conflicts of interest.

References

- [1] Bordage, G. (2009) Conceptual Frameworks to Illuminate and Magnify. *Medical Education*, **43**, 312-319. <https://doi.org/10.1111/j.1365-2923.2009.03295.x>
- [2] Takanashi, T. (2005) Entirety and Individuality of Chi. The Annual Bulletin of Knowledge Management Society, Tokyo.
- [3] Hiragami, F. (2023) Developing Skills in Intra-Workplace Rehabilitation Education: I. *Open Journal of Therapy and Rehabilitation*, **11**, 63-81. <https://doi.org/10.4236/ojtr.2023.113006>
- [4] Hiragami, F. (2022) Development of a Theoretical Model for Simulation Education to Foster Knowledge, Skills, and Attitudes in Rehabilitation Medicine. *Journal of Japan Association for Simulation based Education in Healthcare Professionals*, **10**, 101-107.

- [5] Hiragami, F. (2010) Proposal of Clinical Practice Models for Effective Decision Making—Development of Expert Clinical Judgment Based on Patient and Professional Experience. *Physical Therapy*, **37**, 181-187.
- [6] Hiragami, F., Nonaka, T., Saitoh, K. and Suzuki, Y. (2015) The Utility of a Care Model to Individualise Rehabilitation in Adults Aged Over 80 Years. *Topics in Stroke Rehabilitation*, **22**, 102-115.
<https://doi.org/10.1179/1074935714Z.0000000029>
- [7] Hiragami, F. (2010) Proposal of a New Practical Clinical Model: Combining a Medical Model and a Disability Model—Development of Competence for Solving Problems and Adopting a Patient–Centred Approach. *Physical Therapy*, **37**, 380-386.
- [8] Hiragami, F., Hiragami, S. and Suzuki, Y. (2016) A Process of Multidisciplinary Team Communication to Individualize Stroke Rehabilitation of an 84-Year-Old Stroke Patient. *Care Management Journals*, **17**, 97-104.
<https://doi.org/10.1891/1521-0987.17.2.97>
- [9] Hiragami, F., Hiragami, S. and Inoue, Y. (2019) Effectiveness of Family-Engaged Multidimensional Team Planning and Management for Recovery in Patients with Severe Stroke and Low Functional Status. *Annals of Rehabilitation Medicine*, **43**, 581-591. <https://doi.org/10.5535/arm.2019.43.5.581>
- [10] Hiragami, F. (2020) Development of a Management Process Model for Rehabilitation Skills Training for Prospective and Practicing Physiotherapists. *Kibi International University Research Institute of Health and Welfare Bulletin*, **21**, 1-10.
- [11] Miller, D.C. and Salkind, N.J. (2002) Elements of Research Design. In: Miller, D.C. and Salkind, J.J., Eds., *Handbook of Research Design & Social Measurement*, SAGE Publications, Thousand Oaks. <https://doi.org/10.4135/9781412984386>
- [12] Hamilton, F. (2021) 800209—What Is a Conceptual Paper?
<https://www.linkedin.com/pulse/800209-what-conceptual-paper-felix-nguyen>
- [13] Bampton, J., Tang, C., McKay, M.J., Paul, S.S., Allen, N.E., Darwell, C., Frawley, J. and Dennis, S. (2022) Teaching Physiotherapy during the Initial Stages of the COVID-19 Pandemic: What Did We Learn? *Education Sciences*, **12**, Article 414.
<https://doi.org/10.3390/educsci12060414>
- [14] Hiragami, F. (2010) Introduction of a Case Conference Using Reflective Methods for Junior Physical Therapists—Clinical Reasoning and Practical Thinking Processes. *Physical Therapy*, **37**, 127-134.
- [15] Hiragami, F. (2021) Practical Clinical Education for Developing Rehabilitation Skills. *Kibi International University Research Bulletin (Medical Care and the Natural Sciences)*, **31**, 17-32.
- [16] Hiragami, F., Harada, K., Inoue, Y., Inoue, S., Saitoh, K. and Ise, M. (2020) Efficacy of Self-Evaluation Checklists in Clinical Practical Education for Physiotherapy. *Kibi International University Research Bulletin (Medical Care and the Natural Sciences)*, **30**, 33-44.
- [17] Bloom, B.S. and Gogus, A. (1956) Bloom's Taxonomy of Learning Objectives. In: Seel, N.M., Ed., *Encyclopedia of the Sciences of Learning*, Springer, Boston, 469-473. https://doi.org/10.1007/978-1-4419-1428-6_141
- [18] Bloom, B.S. (1972) Taxonomy of Educational Objectives: The Classification of Educational Goals. McKay Company, Ketchikan.
- [19] Simpson, E.J. (1972) Educational Objectives in the Psychomotor Domain (PDF). Gryphon House, Washington DC, 25-30.
- [20] Anderson, L.W., Krathwohl, D.R., Airasian, P.W., Cruikshank, K.A., Richard E.M.,

- Pintrich, P.R., Raths, P.J. and Wittrock, M. (2017) A Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives: Complete Edition. Longman, New York.
- [21] Krathwohl, D.R. (2002) A Revision of Bloom's Taxonomy: An Overview. *Theory into Practice*, **41**, 216-228. <https://www.depauw.edu/files/resources/krathwohl.pdf>
https://doi.org/10.1207/s15430421tip4104_2
- [22] Jones, E.A. and Voorhees, R.A. (2002) Defining and Assessing Learning: Exploring Competency-Based Initiatives Report of the National Postsecondary Education Cooperative Working Group on Competency-Based Initiatives in Postsecondary Education. National Center for Education Statistics, Office of Educational Research and Improvement, Washington DC.
- [23] Roegiers, X. (2016) A Conceptual Framework for Competencies Assessment. UNESCO International Bureau of Education.
<https://unesdoc.unesco.org/ark:/48223/pf0000245195>
- [24] Matsushita, K. (2021) What Are Competencies in Education? Their Essential Characteristics and the Triple Model. *Kyoto University Research in Higher Education*, **27**, 84-108. <http://hdl.handle.net/2433/268230>
- [25] Matsushita, K. (2022) Current Status and Challenges of Competency-Based Education in Japanese Universities. *The Institution of Professional Engineers Japan Journal*, **2**, 32-33.
- [26] World Physiotherapy (2021) Physiotherapist Education Framework. World Physiotherapy, London.
- [27] Miller, G.E. (1990) The Assessment of Clinical Skills/Competence/Performance. *Academic Medicine*, **65**, S63-7. <https://doi.org/10.1097/00001888-199009000-00045>
- [28] Manisha, R. and Preeti, G. (2017) Effectiveness of Mini-Clinical Evaluation Exercise (Mini-Cex) in Assessment of Physiotherapy Students. *International Journal of Pharma and Bio Sciences*, **8**, 107-111.
<https://doi.org/10.22376/ijpbs.2017.8.4.b107-111>
- [29] Norcini, J.J. (2005) The Mini Clinical Evaluation Exercise (Mini-CEX). *The Clinical Teacher*, **2**, 25-30. <https://www.theclinicalteacher.com/>
<https://doi.org/10.1111/j.1743-498X.2005.00060.x>
- [30] Natish, B., Helen, G., Taruna, B. and David, W. (2013) DOPS Assessment: A Study to Evaluate the Experience and Opinions of Trainees and Assessors. *Medical Teacher*, **35**, e1230-e1234. <https://doi.org/10.3109/0142159X.2012.746447>
- [31] Hassan, S. (2011) Faculty Development: DOPS as Workplace Assessment. *Education in Medicine Journal*, **3**, 32-43. <https://doi.org/10.5959/eimj.3.1.2011.or4>
- [32] Barton, J.R., Corbett, S. and van der Vleuten, C.P. (2012) The Validity and Reliability of a Direct Observation of Procedural Skills Assessment Tool: Assessing of Senior Endoscopists. *Gastrointestinal Endoscopy*, **75**, 591-597.
<https://doi.org/10.1016/j.gie.2011.09.053>
- [33] McCormick, S. (2019) The Fight against Tick Boxing. Broken Toy. Post Breakdown Thoughts on Emergency Medicine.
<https://brokentoydotblog.wordpress.com/2019/07/22/the-fight-against-tick-boxing/>
- [34] Naeem, N. (2013) Validity, Reliability, Feasibility and Educational Impact of Direct Observation of Procedural Skills (DOPS). *Journal of College of Physicians and Surgeons Pakistan*, **23**, 77-82.
- [35] Farajpour, A., Amini, M., Pishbin, E., Mostafavian, Z. and Farmad, S.A. (2018) Using Modified Direct Observation of Procedural Skills (DOPS) to Assess Undergra-

- duate Medical Students. *Journal of Advances in Medical Education & Professionalism*, **6**, 130-136.
- [36] Khanghahi, M.E. and Fard Azar, F.E. (2018) Direct Observation of Procedural Skills (DOPS) Evaluation Method: Systematic Review of Evidence. *Medical Journal of The Islamic Republic of Iran*, **32**, Article 45. <https://doi.org/10.14196/mjiri.32.45>
- [37] Amin, Z., Chong, Y. and Khoo, H. (2006) Direct Observation of Procedural Skills (Chapter16). In: Amin, Z., Chong, Y. and Khoo, H., Eds., *Practical Guide to Medical Students*, World Scientific Printers, Singapore, 71-74. https://doi.org/10.1142/9789812773586_0016
- [38] Cobb, K., Brown, G., Jaarsma, D. and Hammond, R. (2013) The Educational Impact of Assessment: A Comparison of DOPS and MCQs. *Medical Teacher*, **35**, 1598-15607. <https://doi.org/10.3109/0142159X.2013.803061>
- [39] Hengameh, H., Afsaneh, R., Morteza, K., Hosein, M., Marjan, S.M. and Abbas, E. (2015) The Effect of Applying Direct Observation of Procedural Skills (DOPS) on Nursing Students' Clinical Skills: A Randomized Clinical Trial Glob. *Global Journal of Health Science*, **7**, 17-21. <https://doi.org/10.5539/gjhs.v7n7p17>
- [40] Bagheri, M., Sadeghnezhad, M., Sayyadee, T. and Hajiabadi, F. (2014) The Effect of Direct Observation of Procedural Skills (DOPS) Evaluation Method on Learning Clinical Skills among Emergency Medicine Students. *Iranian Journal of Medical Education*, **13**, 1073-1081. <http://ijme.mui.ac.ir/article-1-2854-en.html>
- [41] Carraccio, C., Englander, R., Gilhooly, J., Mink, R., Hofkosh, D., Barone, M.A. and Holmboe, E.S. (2008) Building a Framework of Entrustable Professional Activities, Supported by Competencies and Milestones, to Bridge the Educational Continuum. *Academic Medicine*, **92**, 324-330. <https://doi.org/10.1097/ACM.0000000000001141>
- [42] Obeso, V., Brown, D., Aiyer, M., Barron, B., Bull, J., Carter, T., *et al.* (2017) Core EPAs for Entering Residency Pilot Program. Toolkits for the 13 Core Entrustable Professional Activities for Entering Residency. Association of American Medical Colleges, Washington DC. <http://aamc.org/initiatives/coreepas/publicationsandpresentations>
- [43] Ten Cate, O. (2014) AM Last Page: What Entrustable Professional Activities Add to a Competency-Based Curriculum. *Academic Medicine*, **89**, 691. <https://doi.org/10.1097/ACM.0000000000000161>
- [44] Ten Cate, O. (2013) Nuts and Bolts of Entrustable Professional Activities. *Journal of Graduate Medical Education*, **5**, 157-158. <https://doi.org/10.4300/JGME-D-12-00380.1>
- [45] Ten Cate, O. and Chen, H.C. (2020) The Ingredients of a Rich Entrustment Decision. *Medical Teacher*, **42**, 1413-1420. <https://doi.org/10.1080/0142159X.2020.1817348>
- [46] Ten Cate, O. and Taylor, D.R. (2020) The Recommended Description of an Entrustable Professional Activity: AMEE Guide No. 140. *Medical Teacher*, **43**, 1106-1114. <https://doi.org/10.1080/0142159X.2020.1838465>
- [47] Ten Cate, O. (2016) Entrustment as Assessment: Recognizing the Ability, the Right, and the Duty to Act. *Journal of Graduate Medical Education*, **8**, 261-262. <https://doi.org/10.4300/JGME-D-16-00097.1>
- [48] Ten Cate, O. (2017) Entrustment Decisions: Bringing the Patient into the Assessment Equation. *Academic Medicine*, **92**, 736-738. <https://doi.org/10.1097/ACM.0000000000001623>
- [49] Ten Cate, O., Hart, D., Ankel, F., *et al.* (2016) Entrustment Decision Making in Clinical Training. *Academic Medicine*, **91**, 191-198.

- <https://doi.org/10.1097/ACM.0000000000001044>
- [50] Dreyfus, S.E. and Dreyfus, H.L. (1980) A Five-Stage Model of the Mental Activities Involved in Directed Skill Acquisition. California University Berkeley Operations Research Center.
https://www.researchgate.net/publication/235125013_A_Five-Stage_Model_of_the_Mental_Activities_Involved_in_Directed_Skill_Acquisition
- [51] Peña, A. (2010) The Dreyfus Model of Clinical Problem-Solving Skills Acquisition: A Critical Perspective. *Medical Education Online*, **15**, Article 4846.
<https://doi.org/10.3402/meo.v15i0.4846>
- [52] Cruess, R.L., Cruess, S.R., Boudreau, J.D., Snell, L. and Steinert, Y. (2015) A Schematic Representation of the Professional Identity Formation and Socialization of Medical Students and Residents: A Guide for Medical Educators. *Academic Medicine*, **90**, 718-725. <https://doi.org/10.1097/ACM.0000000000000700>
- [53] Cruess, R.L., Cruess, S.R. and Steinert, Y. (2016) Amending Miller's Pyramid to Include Professional Identity Formation. *Academic Medicine*, **91**, 180-185.
<https://doi.org/10.1097/ACM.0000000000000913>
- [54] Sato, M. (1995) Toward a Dialogic Practice of Learning. In: Saeki, Y., Fujita, H. and Sato, M., Eds., *Invitation to Learning*, University of Tokyo Press, Tokyo, 49-91.

Appendix 1. The Relationship between Five Typologies

Learning Levels: Dreyfus and Dreyfus	Clinical Model-Hiragami Rehabilitation Practice Process	Japanese Cognitive (C)	Simpson Psychomotor (P)	Bloom Affective (A)
1. Student	1. Clinical Features Understanding of patient illness and medical conditions and information about the processes of medical treatment. Knowing changes to current conditions and acute phase treatment information.	1. Data Unorganized facts	1. Perception The ability to use sensory cues to guide motor activity. This ranges from sensory stimulation, through cue selection, to translation.	1. Receiving Phenomena Awareness, willingness to hear, selected attention
2. Novice	2. Psychological Aspects Knowing the specificity of mental, psychological, intellectual, motivation, etc. Knowing deviations between pre-illness life and lifestyle habits and current conditions, etc. and current prognosis, ongoing prognosis	2. Information Organized and meaningful	2. Set Readiness to act. It includes mental, physical, and emotional sets. These three sets are dispositions that predetermine a person's response to different situations	2. Responding to Phenomena Active participation on the part of the learners. Attends and reacts to a particular phenomenon
3. Advanced Beginner	3. Environmental Aspects The student will work 1 - 3 until getting used to the new knowledge and skills. Then work 4 and 5 together. The last one is 6. Know to living environment-related human, material, and institutional information. Knowing family wishes and requests, such as transfer or discharge destination, nursing circumstances, etc.	3. Knowledge Valuable information (Chi-shiki)	3. Guided Response The early stages in learning a complex skill that includes imitation and trial and error. Adequacy of performance is achieved by practicing.	3. Valuing The worth or value a person attaches to a particular object, phenomenon, or behavior. This ranges from simple acceptance to the more complex state of commitment
4. Competence	4. Functional Impairment Features Awareness of the disability characteristics of the physically active and motor functions, characteristics are strengths. Realizing the possibility of improvement in patient activity ability and functional recovery, etc.	4. Wisdom Action Wisdom (Chi-e)	4. Mechanism This is the intermediate stage in learning a complex skill. Learned responses have become habitual and the movements can be performed with some confidence and proficiency.	4. Organizing Organizes values into priorities by contrasting different values, resolving conflicts between them, and creating a unique value system. The emphasis is on comparing, relating, and synthesizing values
5. Proficient	5. Issue Identification	5. Mind	5. Complex Overt Response	5. Characterization

Continued

	The possibility of recovery and improvement is found, and what should be done in the current situation and the action directions (intervention points) to solve the problem as soon as possible and as a priority are understandable. The best approach, which is the key to success, is found after practical trial and error.	Conscious Knowledge (Chi-shin)	The skillful performance of motor acts that involve complex movement patterns. Proficiency is indicated by a quick, accurate, and highly coordinated performance.	Has a value system that controls their behavior. The behavior is pervasive, consistent, predictable, and most importantly, characteristic of the learner.
6. Expert	6. Goal Setting Able to set weekly milestones and practice tasks that can be achieved immediately, after one month and at the time of discharge from the hospital. To be able to reason about the realization of goal setting with rationale based on the progress of the process.	---	6. Adaptation Skills are well developed and the individual can modify movement patterns to fit special requirements.	----- -----
7. Master	7. Communication Propose and communicate to the patient's family the path and process for the patient's life after discharge from the hospital. Share the purpose of rehabilitation (what for), goals (what to achieve by when), and strategies (how to achieve the goals) with multiple staff members "functional impairment features" and "issue extraction"	---	7. Origination Creating new movement patterns to fit a particular situation or specific problem. Learning outcomes emphasize creativity based upon highly developed skills.	----- -----