A Curriculum Committee Toolkit for Addressing the 2013 CAPE Outcomes

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I.   Overview

The 2013 Revised Center for the Advancement of Pharmacy Education (CAPE) Educational Outcomes is the fourth version of education outcomes created to help guide colleges and schools of pharmacy in curriculum planning, delivery, and assessment. The educational outcomes included in the 2013 revised CAPE are meant to direct the focus of Doctor of Pharmacy (PharmD) curricula to ensure graduates possess the knowledge, skills, abilities and attitudes required for entry into the profession. The 2013 revised CAPE include four broad domains and fifteen subdomains that should be implemented throughout pharmacy curricula in a holistic manner. The four broad domains of the 2013 revised CAPE include foundational knowledge, essentials for practicing pharmacy and delivering patient care, approaches to practice and care, and the ability to develop professional and personal competencies. The implementation process should include strategic planning to guide curricular design or redesign and the inclusion of corresponding, appropriate assessment methods.[1]

In most colleges and schools of pharmacy the Curriculum Committee (CC) is responsible for ensuring the curriculum aligns with programmatic outcomes. The CC is also responsible for ensuring that changes to accreditation and national guidelines are incorporated within the programmatic outcomes and curriculum. In 2008 Carter and colleagues re-surveyed CC Chairs from across the United States in order to ascertain whether and how committee structure, function, and charges may have changed since 1994 (original survey). Eighty-five of 100 pharmacy programs participated in the study. Seventy percent of the respondents indicated that the CC maintained primary responsibility for curricular oversight as follows: systematic course reviews (65%), curriculum revisions (83%), assessing curriculum competencies (45%), and developing curriculum competencies (38%).[2]

The 2013 revised CAPE is to be used by colleges and schools of pharmacy as a means of continuous quality improvement to ensure program-specific learning outcomes remain in alignment with the Accreditation Council for Pharmacy Education (ACPE) guidelines. Initial considerations by CC will be to determine how to incorporate the 2013 revised CAPE. Colleges and schools may choose to adopt the 2013 revised CAPE as written, expand or edit CAPE, or incorporate parts of CAPE into existing program-specific outcomes.[1] Once program outcomes are approved the CC will then determine whether to develop a new curriculum or enhance the existing.

When seeking to incorporate the 2013 revised CAPE, the CC will need to ensure that the curriculum is / remains integrated (horizontal, vertical, and/or spiral) to include higher-order learning, coherent and relevant educational experiences, and fosters connectedness across the sciences. Attention to these areas is particularly important since pharmacy graduates will need to function in integrated health care systems, managing patients with complex medication profiles.[3] In order to produce competent graduates who meet or exceed the ACPE Standards it is imperative that a curriculum is integrated, and includes content of increasing rigor, depth, and breadth to support student retention and mastery.

The goal of curricular integration is to ensure that the intended curriculum, enacted curriculum, learned curriculum, and assessed curriculum are all aligned. The intended curriculum is that listed in the college / school catalog. The enacted curriculum is what is actually taught in the classroom, corresponding with information found in course syllabi. The learned curriculum encompasses classroom experiences, and the assessed curriculum is what is actually tested / examined.[3-5] When thoughtfully undertaken curricular integration can increase awareness of expected goals and objectives by faculty and students; additional benefits that may be appreciated include improving curricular efficiency (e.g. leveling material progression) and challenging students to apply previously learned knowledge and skills, which may promote long-term retention.[6] Assessment of curricular integration is imperative to affirm students are able to correlate material from the disciplines / sciences and apply this knowledge across practice environments, thereby demonstrating achievement of curricular and programmatic outcomes.

Curricular integration requires careful consideration and review. Curricular content cannot simply be tied together across courses. Faculty from across disciplines must work together to ensure concepts are addressed in an organized, logical order. The depth and breadth of concepts should gradually increase in rigor as students progress through the curriculum (knowledge progression). At each level / stage of the curriculum lectures, activities, and assignments must align with the progression to maximize knowledge retention. When a stepwise progression of information is appropriately incorporated the time allotted per topic may be reduced, which may allow for the incorporation of additional content. Faculty may be initially resistant to this change, however it should be viewed as an opportunity for curricular enhancement.[6]

The mission of the AACP Curriculum SIG is to: 'work within the Academy to focus on, promote and address key issues related to curriculum in pharmacy schools to ensure that curricula are always meeting the current and future needs of pharmacy graduates'. As such, the purpose of this paper is to develop a toolkit CC can use to facilitate the validation of curricular alignment, integration, progression, and retention with the 2013 revised CAPE outcomes. The toolkit includes guidance on how to verify a curriculum is structured to support integrative learning, and designed to achieve learner and programmatic outcomes. The document will provide an overview of how interprofessional education (IPE) can be incorporated to address the 2013 revised CAPE, accreditation standards and professional practice requirements. Interprofessional education can support curricular integration efforts, allows for purposeful curricular progression, and has been documented to enhance the retention of learned material.

The toolkit will also provide guidance to CC on how to assist course coordinators with the incorporation and mapping of the 2013 revised CAPE with course objectives. The toolkit will provide guidance for how CC may longitudinally monitor curricular progression to ensure appropriate rigor, depth, and breadth, and assess achievement / attainment of outcomes.

Lastly, the current paper was written in conjunction with that prepared by the Assessment Special Interest Groups (SIG) to assist colleges and schools of pharmacy with the incorporation of the 2013 revised CAPE. The papers taken together facilitate the enhancement of curricular and assessment plans to ensure graduates meet or exceed the 2013 revised CAPE regardless of chosen format. Recognizing that CC and Assessment Committees must collaborate to achieve PharmD programs objectives, the two papers have intentionally been written through a common lens, focusing on the curricular and assessment cycles. Together these papers may be considered a Curricular and Assessment Blueprint for Learning Experiences (CABLE).

II.   Curriculum Integration (Smith, Poirier, and Ghilzai)

A curricular design that incorporates integration as its basic premise is necessary to optimally address the 2013 revised CAPE, which states that the learner should be able to develop, integrate and apply knowledge from the foundational sciences to perform patient care and pharmacy functions.[1] Dee Fink in his book, *Creating Significant Learning Experiences: An Integrated Approach to Designing College Courses* presents taxonomy of significant learning that is viewed as a circular process including integration where knowledge is connected to application of ideas, to people and to authentic real world situations.[7] Curricular integration includes connecting foundational sciences with the practice of pharmacy and includes both a structure and a process. Curricular integration is not a single goal to strive for but rather a flexible process that allows students to develop, integrate, and apply knowledge; therefore there is no one correct way to integrate a pharmacy curriculum.[8-9]

Curriculum integration can be horizontal, vertical, or spiral. Horizontal integration refers to integration that combines different disciplines. There are three different approaches to horizontal integration (*Figure 1*): multidisciplinary (each discipline separately focuses on a common theme); interdisciplinary (disciplines come together on a shared understanding of a topic); and transdisciplinary (where integration is so transparent there is no distinction between disciplines). Designing a horizontally integrated curriculum occurs across a continuum, proceeding from one delivered in isolation to a fully transdisciplinary approach. Vertical integration refers to integration that combines both the progression of the curriculum over time (i.e. content builds from one topic to another), and ensures theory and practice are combined in the learning process (*Figure 2*).[3] Spiral integration is the incorporation of both horizontal and vertical with increasing complexity at different stages in the curriculum (*Figure 3*).[3, 10]

Harden developed an integration ladder (*Figure 4*) to explain the steps that occur from subject-based integration through to a fully integrated teaching and learning curriculum.[10] The bottom four steps of the ladder predominantly focus on particular subjects or disciplines; the next six steps demonstrate integration across disciplines; and the top most step requires students to perform self-integration. The steps of the integration ladder are as follows:

4

Step 1 - Isolation: Each course organizes their teaching in a silo with no consideration of other courses or disciplines.

Step 2 - Awareness: Concepts are still subject-based but there is some mechanism for communication between instructors so people are aware of what others are teaching but there is no attempt to help the student integrate the material between the courses or subjects being taught.

Step 3 - Harmonization: Subject matter stills remains separate but instructors communicate and discuss ways to refer to connections within material throughout each other's lectures. There is a more deliberate effort to try and make connections to help students integrate the material being presented.

Step 4 - Nesting: Subject matter is still separated and the teaching is handled in a discipline / subject matter manner, but subject matter is taught so as to relate the concepts to the broader programmatic outcomes for the school. An example would be using clinical medicine to demonstrate concepts being taught in a pathophysiology course thus teaching both pathophysiology concepts and problem solving skills.

Step 5 - Temporal Coordination: Timing of when topics are taught in a particular subject is done in consultation with other disciplines even though the teaching remains separate. With this approach, students study the concepts for each subject separately so they are still left to integrate the material on their own.

Step 6 - Sharing: Where two disciplines will agree to implement a teaching program together. The combined course will have shared concepts, skills, and attitudes.

Step 7 - Correlation: Subject-based courses are still the main focus of the curriculum and courses are still subject-based but there is an integrated teaching session or course that is added to the curriculum in order to help students see the integration in the topics.

Step 8 - Complementary Programs: Curriculum includes both subject-based and integrative teaching. The integrated sessions are now the norm in the curriculum with very few subject-specific courses.

Step 9 - Multidisciplinary: Curriculum has courses that contain multiple subject matters in one course and the focus of the course is the problems, topics, and issues as opposed to the subjects themselves.

Step 10 - Interdisciplinary: There is no reference to individual subjects or disciplines and items are not signaled out in the student timetable.

Step 11 - Transdisciplinary: The student, who has been given the tools by the instructor, does their own integration based on hi-fidelity simulations and / or real-world clinical care. The majority of students will experience this step during students Advanced Pharmacy Practice Experiences.

The Steps most commonly used when designing pharmacy curricula are 5 (Temporal Coordination), 7 (Correlation), 8 (Complementary Programs), 9 (Multidisciplinary), 10 (Interdisciplinary), and 11 (Transdisciplinary).[11-15] It must be emphasized that the incorporation of integration does not have to evolve in a step-wise manner, rather the steps used should be aligned with pedagogic and assessment methods.

The 2013 revised CAPE domains of foundational knowledge, essentials for practice and care, approach to practice and care, and personal and professional development can all be addressed if an optimal integrative structure and process is employed. The subsequent paragraphs will address integration models and provide resources to guide the curricular design and development process (*Table 1*). Curricular integration should include elements at three levels: program, curriculum and pedagogic. Curriculum Committees need to decide what types of integration they will use to incorporate the 2013 revised CAPE (i.e. horizontal, vertical, or spiral), and the integration ladder Steps to ultimately achieve these outcomes.

Programmatic Considerations

At the pharmacy program level, several key points should be considered when starting the integration process: (1) the mission, vision, goals and desired programmatic outcomes; (2) the 2013 revised CAPE Domains, if not already incorporated within the programmatic outcomes; (3) ACPE Accreditation Standards; and (4) available resources including a discussion about possible obstacles that may be encountered.

The mission, vision, goals, and desired programmatic outcomes will assist in selecting the integrative structure and the process for integrating subject matter along a continuum (*Figure 4*). Horizontal integration occurs across subjects within the same level of the program. An example of horizontal integration is the use of problem-based learning to incorporate concepts learned in a Pharmacotherapeutics course. Other examples include a themed approach such as: discipline theme, organ system theme, or chronological theme.

Vertical integration extends information learned at one level into other levels of the program including themes or threshold concepts. Vertical integration unfolds the curriculum in a logical fashion with an attempt to connect real-world concepts at each level.[3] An example is the traditional approach in which the basic and pharmaceutical sciences occur during the first year of a program and are re-emphasized in later years. Clinical experience typically occurs later in the program, however possibilities exist for inclusion of some concepts during Introductory Pharmacy Practice Experiences (IPPE). Even within this structure the delivery method may include steps that are higher on the integration ladder. An inverted triangle integration structure includes clinical experience from the very beginning of the program that gradually increases in length and depth.[3]

A spiral integration model involves both horizontal and vertical aspects with increasing complexity at various stages of the curriculum. This flexible model moves from simple to complex concepts allowing for higher level objectives and the reinforcement of concepts in a logical sequence.[16] Thorough consideration of the necessary resources for curricular integration is imperative and typically includes the following:[9]

1.   Adequate time for curricular design, delivery, and assessment. Faculty need time to revise courses and individual lessons. The time required will vary according to the degree and type of

6

integration, for example interdisciplinary and transdisciplinary delivery require the most time to coordinate.

2.   Personnel or other administrative resources necessary for coordinating the delivery and assessment of an integrated curriculum across disciplines or academic years. The incorporation of these types of curricular changes may necessitate the re-alignment of teaching assignments and classroom schedules in order to address the needs of faculty and students. Dedicated administrative resources and personnel should foster a cooperative environment, improve levels of interest in curricular integration, and prevent competition for topic coverage.

Curricular Considerations

For integrative learning to occur, students should have a good understanding of subject knowledge and skills (between theory and practice). Students need to be able to integrate knowledge and skills across didactic courses and pharmacy practice experiences. Pharmacy programs should prioritize planning strategies to develop new models that provide students with more purposeful, progressively challenging, integrative learning experiences across the curriculum.

The content areas noted in *Table 1* can be integrated to address the 2013 revised CAPE in both didactic and experiential courses across the curriculum. Integrative learning goes beyond curricular boundaries, students will adopt integrative learning similar to professionalism, leadership and lifelong learning. Integrative learning supports and enhances a solid foundation of critical thinking. Integrating professionalism and ethics promote a higher level of alertness and sincerity towards pharmacy and other healthcare professions. Inclusion of relevant geriatrics content within didactic coursework and pharmacy practice experiences can address the issue of providing quality care to this population. Case studies and lecture based content mapping may facilitate the incorporation of specialties such as women's health as it has in medical curricula. Similarly programs should use this opportunity to enhance the incorporation of cultural competency training from limited or elective coursework to across didactic and practice experiences. At some programs, active-learning strategies and service learning is incorporated, and knowledge and skill competencies are assessed in patient-centered, culturally sensitive health care environments.

Interprofessional education (IPE) can be integrated by identifying the curricular topics that align across the health professions (whether at the curriculum or accreditation standards level). Most importantly, IPE should be evaluated and outcomes should be shared in a holistic way that represents scholarly work. Additional information is available later within the IPE Section.

7

Integrative outcomes and course learning objectives should be mapped to the 2013 revised CAPE, ACPE Standards, and NAPLEX Blueprint. Examples of topics that lend well to integration across a curriculum include (*Table 1*):[3, 15,17-20, 21-23]

- Writing skills
- Critical thinking skills
- Communication skills
- IPE
- Cultural competency
- Leadership and group / team dynamics
- Service learning
- Professionalism and ethics
- Geriatrics
- Technology and informatics

Pedagogical Considerations

Fink's principles of integrative course design and perspectives on taxonomy to create significant learning, courses and classroom sessions can be structured to integrate knowledge and applications to practice.[7] In particular to achieve higher levels of learning in terms of application, synthesis and evaluation requires course and session integration.

The various pedagogies that support integrative learning include: problem-based learning, team-based learning, case studies, skills laboratory, using thematic approaches to structure learning of various disciplines, and capstone courses. Articles that provide examples of the different pedagogic approaches are provided in *Table 1*.

Assessment

Curriculum Committees need to work closely with the Assessment Committee or other parties responsible for programmatic assessment within the college or school to ensure that programmatic assessment activities are designed to assess whether students are meeting the 2013 revised CAPE and other programmatic outcomes via an integrative curriculum. Step one in the process is ensuring that student learning outcomes have been written correctly as discussed in the Assessment SIG CAPE paper entitled *Are you CAPE-A.B.L.E: An Assessment Blueprint for Learning Experience*.

Prospective curricular mapping is essential for ensuring content integration is as intended and that the 2013 revised CAPE and programmatic outcomes have been covered. Curricular mapping can be accomplished through the use of an Excel or Access database, or programs can purchase proprietary mapping software, examples of which are provided in the Assessment SIG paper. Example tables are provided later in this paper. Electronic testing software, such as ExamSoft, may be useful for collecting data on how students are achieving the 2013 revised CAPE and programmatic outcomes throughout the curriculum thus allowing CC to ensure horizontal, vertical or spiral integration is appropriate.

III.   Progression and Retention (Dey, Truong, and Henriksen)

Just as curriculum integration is important to ensure future graduates' preparedness and competence, there is a need to measure the retention of knowledge as a function of the progression through the professional program. Literature suggests that the use of active learning pedagogies increases student participation and may increase the retention of fundamental knowledge.[27-29] Student engagement through the implementation of active-learning strategies and the application of core fundamental concepts should lend towards enhanced information retention.

Unfortunately there is a dearth of published literature regarding the progression and retention of knowledge, and universal, validated tools to measure have not been developed. *Table 1* includes references from the health professional literature regarding efforts to enhance curricular progression and knowledge retention. Many colleges and schools of pharmacy have developed end-of-year and/or end-of-semester (i.e. capstone) assessments to measure knowledge retention, which may help gauge the retention of learned concepts. The collected information provides meaningful data regarding concept progression and may serve as an indicator of student academic success in the program.

Miller's Pyramid (*Figure 5*) of Clinical Competence, proposed by psychologist George Miller, describes a conceptual framework containing four levels: *knows*, *knows how*, *shows how* and *does*.[36] Each level denotes not only what to assess but also the type of measurement to be used per level. *Knows* denotes knowledge, *knows how* competence, *shows how* performance, and *does* action. The base levels of the pyramid, *knows* and *knows how*, are categorized as cognitive skills. These levels can be assessed by traditional examination methods using multiple choice questions, but may not be predictive of subsequent achievement. The cognitive foundation must be attained in order to achieve the upper levels. S*hows how* and *does* are categorized as behavioral. Student progression to the behavioral levels requires the use of different tools and instructional methods.

As stated above, traditional examination methods that use multiple choice questions can be used to assess knowledge and competence; however, assessing performance and action requires the use of more advanced pedagogic methods. Miller discusses that Bloom's Taxonomy can guide the development of multiple choice questions to test at the level of analysis or evaluation, using recall questions that include examples of practice experience.[36] For example a student who observed a patient being treated for a complicated diabetic foot ulcer may not require a higher level process to answer a multiple choice question since the student can recall what was observed in practice. Since faculty cannot ensure similar experiences across all students the use of other instructional methods may be better suited to more appropriately assess progression to these levels.

The assessment of knowledge progression and retention at the third level, *shows how*, is important to accomplish prior to students embarking on experiential training. At this level the use of simulation to assess student achievement can be very beneficial. The incorporation of standardized patients (SP) can provide a platform for discussion to ensure students encounter similar educational experiences and the attainment of learning objectives.[27] Interprofessional education (IPE) can also be incorporated at this level. Activities incorporating the use of SP and/or IPE can be either formative or summative. A method commonly used to assess the *shows how* level is the Objective Structured Clinical Examination (OSCE). The OSCE are beneficial for assessing student behaviors prior to progression into clinical settings so that corrective measures can be undertaken. The OSCE may also be used to assess the 2013 revised CAPE affective domain (as per Bloom's taxonomy) since its vital for professional practice.

Progression to and retention at the top level of the Pyramid, *does*, can be assessed during Introductory Pharmacy Practice Experiences (IPPE) and Advanced Pharmacy Practice Experiences (APPE). Observing student interactions in practice is the ideal assessment at this level; however gathering comparable data on students may be challenging, due to the wide variety of experiences and evaluators. Accurate student assessment will depend on the quality of the assessment instrument or rubric, and adequacy of preceptor training to ensure inter-rater reliability.

The four levels of Miller's Pyramid can be used to assess knowledge progression and retention within and across the four 2013 revised CAPE Domains.[36] The following sections will discuss how these levels apply to each CAPE Domain and provide corresponding instructional methods that may be utilized to assess knowledge progression and retention.

Domain 1 – Foundational Knowledge

The primary focus of this domain is the retention and application of knowledge from what are considered the fundamental, foundational courses (e.g. biochemistry, pharmacology, etc.).[1] The domain encompasses both of Miller's cognitive domains *knows* and *knows how*.[36] In this domain students demonstrate how obtained knowledge can be used to evaluate, analyze and solve therapeutic cases. The knowledge obtained from these fundamental, foundational courses is vital to the understanding and analysis of the scientific literature and new therapeutic guidelines. Demonstration of knowledge retention may serve to estimate student higher order thinking capabilities.

Pharmacy curricular structure may differ across programs, but there is shared alignment in regard to attainment of the domain. Using the first professional year as an example, students are enrolled in the fundamental, foundational courses, whether structured as independent or integrated courses, traditional or block sequence. The students may also be involved with IPPE in a variety of formats (e.g. distinct blocks of time or longitudinal), which affords direct visualization and possible application of learned materials. Additionally, many programs have implemented longitudinal courses that allow for deliberate incorporation, simulation and application of information from other courses, along with distinct, new topics (e.g. communications). Lastly, programs may incorporate capstones / milemarker assessments at the end of the first year, encompassing material taught across the entire year, the focus of which is to assess the retention of knowledge (directly) and possibly identify areas where curricular enhancement may be necessary (indirectly). Programs may assign stakes or levels to these assessments to ensure accountability, and have corresponding remediation methods should a student fall short of expectations. Student demonstration of information mastery is essential for continued success as they progress through a program.

Domain 2 – Essentials for Practice and Care

The primary focus of this domain is the different components of patient care, as specified within the four subdomains: patient-centered care, medication use systems management, health and wellness and population-based care.[1] Within traditional pharmacy programs attention to the subdomains will be progressive over the course of the curriculum and as such will address all four levels of Miller's Pyramid.[36]

To provide an example using the sub domain of patient-centered care, a student must first appreciate (*know*) what specific information and data to gather about a patient. Once the information and data has been collected the student will then demonstrate that they are able to (*knows how)* to interpret and analyze. Once a student has demonstrated these cognitive levels, the next step might be an interaction with a SP in order to gather the appropriate patient specific information through probing questions and performing physical assessments in a controlled environment (*shows how*).[28] Using a controlled environment allows for the gathering of comparable data about students when they are exposed to the same or very similar situation to ensure all are attaining the required objectives. Students proceed to the *does* level as they participate in IPPE and APPE when interacting with patients, demonstrating attainment of learned knowledge, skills and abilities in practice.

Domain 3 - Approach to Practice and Care

The primary focus of this domain is the skills needed to practice and provide patient care, as specified within the six sub domains: problem solving, educator, patient advocate, interprofessional collaboration, cultural sensitivity, and communication.[1] One method of instruction that assists with the implementation of this domain is problem-based learning (PBL), where key educational concepts are presented as a case study, and students work in teams to address the patient case in a stepwise fashion (e.g., what is known, hypothesis, action plan, and learning issues).

During PBL faculty serve as facilitator to move the exercise/activity along without providing extensive knowledge or expertise. During team discussions each student will share identified issues and other topics of interest obtained through individual research and information gathering. The incorporation of PBL has been shown to promote the long-term retention of subject matter along with supporting the development of problem solving skills, teamwork, and student-driven learning.[37]

In relationship to Miller's Pyramid the *knows* and *knows how* can be addressed through the use of sequential, progressive case disclosure.[36] Cases provided during the first professional year of the curriculum would not require the use of clinical or therapeutics knowledge, rather would (potentially) focus on the development of problem-solving skills (subdomain 3.1) and cultural sensitivity (subdomain 3.5). For example, the case may focus on a patient facing multiple social barriers (e.g., homelessness, poverty) who is non-compliant with their medication regimen. A case such as this would require the team to communicate (subdomain 3.6) and collaborate (subdomain 3.4) with one another to solve the problem. Part of the solution would include generating ways to educate (subdomain 3.2) the patient on the importance of the medication, provide advocacy for (subdomain 3.3), and empower the patient to pursue potential assistive resources.

During the second professional year, cases would begin to include therapeutics and other relevant subjects learned across the curriculum in order to reinforce learned concepts. Within the third professional year instruction would progress to the *shows how* of Miller's Pyramid as demonstrated through active learning exercises such as simulations (live or electronic), interactions with SP, and OSCE.[27, 28, 36] Students would demonstrate their cognitive abilities through patient counseling, presentations to a healthcare team member, or solving complex problems across various stations. Interprofessional education (IPE) may also be used to address this domain as will be discussed later in the paper.

The aforementioned progression of activities culminates to the *does* of the Miller's Pyramid as students engage in IPPE and APPE. Faculty and/or preceptors will monitor student attainment of experiential learning objectives, providing feedback during midpoint and final evaluations. In order to progress students must demonstrate the requisite knowledge, skills and abilities as per course requirements.

Domain 4 – Personal and Professional Development

The primary focus of this domain is the development of attitudes and behaviors that are vital for becoming a culturally sensitive, compassionate, and professional pharmacist, as specified within the four subdomains: self-awareness, leadership, innovation and entrepreneurship, and professionalism.[1] The concepts within this domain focus primarily on the *shows how* and *does* of Miller's Pyramid and are the most difficult to teach and assess.

Recognizing this challenge, the American Pharmacists Association, Academy of Student Pharmacists (APhA-ASP) and American Associate of Colleges of Pharmacy (AACP) jointly released a *Pharmacy Professionalism Toolkit for Students and Faculty* to help guide pharmacy programs with instilling professional values among student pharmacists and support programmatic professional socialization efforts (in general).[38] The Toolkit provides examples of activities that may assist with the attainment of subdomain 4.4 (professionalism) competencies pertaining to: knowledge and skills, self-improvement, service orientation, pride in the profession, covenantal relationship with others, creativity and innovation, conscience and trustworthiness, accountability, ethically sound decision-making, and leadership.

Personal and professional development should begin with self-awareness (subdomain 4.1). By recognizing one's strengths and areas in need of improvement, one can seek opportunities for enhancement. A concept such as this should be introduced during the first professional year utilizing self-awareness tools such as the Myers Briggs Typology Inventory or Strengths Finder 2.0 (by Tom Rath).[39, 40] Self-exploration of this nature may provide students with the *know* and affords students the opportunity to demonstrate the *knows how* through activities such as the development of an individual mission and goal statements. These types of exercises may also assist the development leadership abilities (subdomain 4.2) as students seek to understand and reflect upon their own leadership style. More information regarding how to incorporate Leadership into the curriculum can be found in the Leadership SIG CAPE paper entitled: *Deliberate Integration of Student Leadership Development in Doctor of Pharmacy Programs*.

At the end of the first professional year students may be requested to submit a self-reflection to demonstrate and document (*shows how*) they have learned about themselves, how they have worked towards their mission and goals, why they did or did not achieve their goals, and what they will change to reach their goals. Students should include a copy of this reflection in their professional portfolio. In certain curriculums student may be asked to discuss these reflections with each other, their professional mentor, or a faculty member as a means of assessing attainment of the *does* level. It is important that this level of self-reflection occur at least annually (with enhancement in mission and goals as applicable) in order to demonstrate student progression and development.

During the second professional year students may be introduced to subdomain 4.3 (innovation and entrepreneurship) through coursework and the incorporation of PBL as described above in Domain 3. For example, students may learn about health systems (*knows*) and examine cases of health system failures. Students will describe how health systems work through the use of root causes analysis (*knows how*). Students will demonstrate the *shows how* for subdomain 4.2 (i.e., leadership) and subdomain 4.3 (innovation and entrepreneurship) by working towards the development of a resolution through group consensus. The same concepts may be revisited during the third professional year at a more advanced level utilizing similar instructional modalities.

Another example applicable to many pharmacy programs pertains to longitudinal skills course sequences, which encompass several semesters or quarters of the curriculum. These courses include core curricular subject matter, but also serve to allow for curricular integration, demonstration of physical assessment and communication skills, IPE activities, and leadership and professional development. Lastly, participation in IPPE and APPE will also afford opportunity to utilize, demonstrate abilities, and be evaluated on the attributes of the *does* level.

Assessment

The companion paper by the Assessment SIG includes a detailed description of assessment methodologies to address each of the four domains. As a means of reiteration for Domain 1 the most utilized methods to assess progression and retention will be examination and course-specific assignments. Capstone exams provide good feedback regarding student retention of knowledge. Additional assessment methods that can be used to ensure the retention of knowledge include the Pharmacy Curriculum Outcomes Assessment (PCOA) and (ultimately) the North American Pharmacist Licensure Exam (NAPLEX) [both accessible at http://www.nabp.net].

Problem-based learning and simulation are examples of assessment strategies that may be used to demonstrate attainment of Domain 2. In addition faculty and/or preceptors can monitor student attainment of experiential learning objectives and provide constructive feedback during midpoint and final evaluations. Similar assessment methods, albeit at an advanced level, may be employed for the attainment of Domain 3. The incorporation of OSCE and IPE activities may provide additional value for student demonstration of Domain 3.

Domain 4 is by far the hardest to conceptualize when designing instructional and assessment activities. As discussed the inclusion of self-assessment instruments and student portfolios may facilitate these efforts. Experiential education will play a key role, as will student participation in extracurricular and co-curricular activities, which although important, will not be addressed in this paper.

IV.   Interprofessional Education (O'Neil)

Among the many essential goals of the 2013 revised CAPE is that pharmacists now and in the future are capable of functioning in a collaborative manner as members of an interprofessional team. To this end, the 2013 revised CAPE includes interprofessional collaboration (Collaborator) as a specific outcome in Domain 3, which will be the predominant focus of this section.[1] The resources cited in this section were selected to aid CC and faculty to develop experiences that prepare future pharmacists as collaborators in the health care environment.

The World Health Organization defines IPE as follows: *When students from two or more professions learn about, from and with each other to enable effective collaboration and improve health outcomes*.[41] While there are various teaching strategies that may be used to develop collaborative attitudes and skills, there is literature to support the use of IPE as an effective modality to achieve these learning outcomes.[42, 43] As such, IPE has been endorsed by the Interprofessional Education Collaborative (IPEC), which is an expert panel consisting of representatives from the following academic health care organizations: Association of Colleges of Nursing, American Association of Colleges of Osteopathic Medicine, American Association of Colleges of Pharmacy, American Dental Education Association, Association of American Medical Colleges, and Association of Schools of Public Health.

The IPEC expert panel was inspired by the vision of interprofessional collaborative practice as being essential to promote the delivery of safe, high quality, accessible, patient-centered care to all.[44] To achieve this vision, IPEC developed interprofessional collaborative competencies that may be utilized in conjunction with discipline-specific competencies to engage students from across the different professions in interactive learning. It is recommended that incorporated IPE learning experiences be linked to one or more of these competencies. The IPEC competencies encompass the following four domains:
Domain 1 – Value and Ethics for Interprofessional Practice
Domain 2 – Roles and Responsibilities
Domain 3 – Interprofessional Communication
Domain 4 – Teams and Teamwork

Curricular Implementation of IPE

Both the AACP and the ACPE have identified IPE as an important pedagogic approach in the education of pharmacy students. While there is great support for implementation of IPE, development of IPE learning experiences may present a variety of challenges to faculty and curriculum development teams. Successful IPE initiatives require a systematic planning, development and implementation process including a plan for faculty and curricula development. Buring and colleagues provide an excellent two-part primer that includes background, essential tips and key resources for implementing IPE.[18, 45]

Faculty development is a critical first step in the implementation of any IPE initiative.[46,47] Faculty involved in IPE need to have the knowledge, skills and values to work within IPE experiences and teams. The IPEC competencies recommended for student learning may also be used to design faculty development programs. Ideal attributes of IPE educators have been suggested and include such traits as group facilitation and team teaching experience, skilled in conflict resolution and connecting theory to practice, and adept in active learning teaching and assessment strategies.[46] By utilizing these essential attributes in a self-assessment process, a program may be developed to meet the needs of the involved faculty. Essential IPE competencies for faculty should include a commitment to IPE, understanding of the roles and responsibilities of IPE partners, positive role modeling, group dynamics, expert facilitation, valuing diversity, and skill in active learning techniques.[48]

The scope and nature of IPE experiences within a curriculum is highly dependent on the availability of partnerships with other disciplines and programs. The varied curricular structure of potential partners and their familiarity with IPE may also present challenges; however IPE is possible regardless of the model of pharmacy education. Five models of colleges/schools of pharmacy have been described: (1) fully integrated academic health center; (2) partially co-located program with pharmacy and other professions under a common university ownership; (3) partially co-located with pharmacy and other professions under different university components; (4) pharmacy with other health professions but no medical school; (5) pharmacy with no other health education programs on campus.[18]

While IPE experiences may be more readily implemented in programs that have co-existing health professions schools the use of creative teaching strategies with technology may facilitate IPE experiences with distant partners. Beyond the traditional classroom or laboratory settings, external learning locations may include academic health clinics and hospitals, off-site clinics, campus simulations centers, campus student health centers, clinics and programs in local school systems, community health centers, community faith-based centers, individual private or group practices, mental health facilities, hospice programs, and long term care facilities.

Development of IPE Experiences in Pharmacy Curricula

With a strong faculty development program and a plan for partnerships the opportunities for IPE are endless. Ideally, IPE experiences should be integrated within didactic, experiential, and co-curricular offerings. Furthermore, IPE activities should be progressive across each of the professional years to facilitate the development of pharmacist as collaborators. Incorporation of early IPE exposure in pre-professional programs is a potential opportunity for 0-6 or 0-5 programs.

As previously noted, a fully integrated IPE program may not be possible due to the structure of programs, availability of partnerships, and availability of resources. Therefore it is recommended to start small with a pilot initiative and continue to grow the program based on outcomes, rather than waiting for all resources to be in place. To facilitate the discovery of opportunities within courses, partners may wish to conduct an inventory to see how to best proceed. A tool developed by Meyer may be used to facilitate this process.[49] The inventory should assist with the identification of common curricular themes and courses into which IPE programming may be incorporated.

Upon conducting an inventory several curricular themes will be identified that are discipline-independent, and thus are a natural fit for IPE experiences. These common themes include, but are not limited to: communication skills (patient and interprofessional), health care ethics, treatment adherence, public health, emergency preparedness, medication errors and other quality assurance and patient safety topics, and care of the patient with chronic illnesses or those in special populations. Buring and colleagues suggest specific competencies, possible learning objectives, teaching strategies and placement for six of these curricular themes.[18] A curriculum guide linking the IPEC competencies with the clinical prevention and population health framework has been developed, and includes nine interactive learning activities with competency maps that may be adapted.[50]

Once themes are selected, it is important to determine when and where the IPE will occur in the curriculum and across schedules. A critical factor for success is matching students with equivalent levels of education. For examples an experience between a first year pharmacy student and fourth year medical student may not yield optimum results. Another important feature is that the IPE experience should be reflective of current practice. Each IPE learning experiences should be optimized to achieve the desired outcomes for each of the involved programs. These experiences do not need to involve every health profession, rather they should be carefully planned and designed to achieve one or more IPEC competencies and permit students to reflect on their progress.

Assessment

Each IPE experience should have an accompanying assessment to determine the impact on the achievement of the IPEC competencies or other developed IPE objectives. At a minimum, student reflection about gained experiences should be completed. Several other assessment tools may be utilized to assess the outcomes of IPE, including the Readiness for Interprofessional Learning Scale (RIPLS), the Interdisciplinary Education Perception Scale (IEPS), and Attitudes Toward Health Care Teams Scale.[51-53]

In a recent comparison of the RIPLS and IEPS, neither scale was found superior to the other; however concurrent validity, discriminative validity and reliability was confirmed.[54] The authors suggested that the RIPLS may be more appropriate for early learners, while the IEPS may be more appropriate for advanced learners who have practice experience. While these instruments have value for assessing outcomes related to perceptions and behaviors, and may also measure team performance, they do not assess the impact of IPE on patient care outcomes.

Correlating outcomes from IPE experiences to improvements in patient care has been limited by the availability of instruments that primarily measure the short-term benefit of specific curricular interventions. A recent report by Dow AW et al[55] describes their experience with a 42-item questionnaire developed from the IPEC competencies to assess programmatic outcomes. The findings from this investigation were promising, such that further utilization and validation of the instrument should prove valuable in providing insight about how IPE may impact patient care.

V.   Summary

The presented information provides an overview of how the 2013 revised CAPE can be used to guide programmatic, curricular and course-specific enhancements. Beyond incorporation of the 2013 revised CAPE proper, CC in conjunction with the Assessment Committee or other responsible parties may use this opportunity to thoroughly review programmatic and curricular plans to ensure alignment with accreditation standards and professional practice. The references included in this toolkit provide valuable information and as such colleges and schools are encouraged to view those that may prove helpful to local needs.

An additional goal of the document was to provide tools that may assist the process of verifying that a curriculum is structured to support integrative learning, and designed so that students achieve programmatic and curricular outcomes. The provided information serves as a guide for CC regarding how to assist course coordinators with the incorporation and mapping of the 2013 revised CAPE with course objectives. The resources are intended to provide guidance regarding how CC may longitudinally monitor implemented curricular enhancements to ensure successful attainment of intended outcomes. Lastly, the document provided an overview of how interprofessional education (IPE) can be incorporated to address the revised CAPE, accreditation standards and professional practice requirements.

In an effort to assist CC with these complicated processes the following tables were derived from the literature. The tables can be adapted to suit program needs and can be used alone or in any combination deemed appropriate. The tables may also be adapted to assist faculty with mapping the 2013 revised CAPE to course objectives.

Steps for Re-evaluating the Curriculum for Insertion of the 2013 Revised CAPE Outcomes

Example Incorporation Method 1: The following table describes a process for considering the implementation of new curricular materials based on an academic review model.[4]

Step	Course of Action	Desired Outcome(s)
Step 1. Plan	Decide what questions are to be answered about the curriculum. The questions should be specific. *Examples include:* *How will the 2013 revised CAPE outcomes be incorporated into the programs existing programmatic outcomes?* *What type of integration do we want to do (horizontal, vertical, or spiral)?* *What step(s) on the integration ladder do we want to address in the curriculum and where?* *What parts of the curriculum already address areas of the 2013 revised CAPE?* *[Course Coordinator] How does my course address the 2013 revised CAPE outcomes?*	
Step 2. Create the Process	Decide what data will be gathered to answer the questions in Step 1 and carefully define the metrics for measurement and the code for the map (i.e. abbreviation to readily assist mapping process). The code used must clearly	

	communicate meaning to faculty.	
Step 3. Gather Data	Plan the process for gathering data and clearly describe the data collection timeline. Considerations include: training, education, and follow-up.	
Step 4. Analysis	Decide how to use the coded and/or other mapping data to answer the pertinent curriculum questions generated in Step 1.	
Step 5. Implement Enhancements	Create an implementation plan to address the enhancements as determined in Step 4.	

Example Incorporation Method 2: The following table provides guidance on how to apply the concept of policy analysis, used within the business sector, to curricular reform.[56] The word policy and related terminology was changed to reflect the actions undertaken by CC, and as such not all considerations/perspectives may be applicable. The intent is to provide structure for the process, thus the table can be adapted at will to address program needs.

Consideration / Perspective	Questions	Analysis	Plan
A. Conceptual	What are the core concepts under discussion? How are they defined? What are their measurable outcomes?		
B. Normative	What "ought to be" true in regard to the curricular change? How are the current actions of faculty and/or students in the college/school different from what "ought to be"?		
C. Theoretical	Within what theoretical framework(s) does the curriculum fit? How would different parties within the program define the curriculum in theoretical terms (what type of integration, what steps on the integration ladder, do we truly allow knowledge progression/retention?)?		
D. Empirical	What literature exists which could prove helpful in illuminating the issues? What important facts do we		

	glean from these studies? Are the findings facts or assertions?		
E. Economic	What impact would the adoption of the curricular change have on institutional fiscal resources? What economic structures (either new or existing) would need to be in place in order to implement the curricular change?		
F. Political	What impact(s) would the adoption of the curricular change have on internal and external constituents? Is it politically feasible to implement curricular changes?		
G. Cultural	How are different organizational, racial, gender and/or professional cultures within the program affected by the curricular change? Are the proposed changes acceptable to various cultures, and why or why not? Is the change based on a sense of fairness or equity to all cultural groups?		
H. Ideological	Are there ideological and informational aspects associated with the curricular changes? Do any parties participating in the curricular development process bring strong ideological frameworks to the discussions? What role(s) do these self-interests play? What potential or actual conflict of interest exists?		
I. Historical	Does the proposed curricular change have a history within the institution? Have previous attempts been made to address the curricular issue under consideration? If so, what was the result? What can be learned from these previous attempts?		
J. Assumptive	Are there key assumptions being made by the parties involved in or		

	affected by the curricular change? What are the assumptions made by those on both sides of the issue? Have these assumptions been made explicit? Are these assumptions known and understood by all decision-makers?		
K. Legal	What legalities or legal precedents may be involved in or have an effect on the proposed curricular change? What key legislation and/or other legal requirements are likely to have an impact on curricular development?		
L. Logical	Are the curricular changes logically sound? Do they avoid illogical or faulty inferences? Can they withstand rigorous scrutiny by neutral third party review?		

Curriculum Mapping Examples: As noted in the Integration Section, the following tables may be useful to CC for mapping current/existing programmatic outcomes to the 2013 revised CAPE.[5] Mapping at the CC level should occur to ensure that all parts of the 2013 revised CAPE and colleges/schools programmatic outcomes are aligned across the curriculum and to reduce repetition or redundancies. Additional columns can be included to address such items as depth or breadth, or instructional level, pedagogic and assessment methods. The tables may be further adapted for use by course coordinators as they proceed with determining how to address the new programmatic outcomes at the course level.

Traditional Map Template

Objective	2013 Revised CAPE Domain	Desired Outcome(s)	Plan

CAPE-Specific Template

Year	Course	2013 Revised CAPE Domains			
P1, P2, P3 or P4	Number or Name	Foundational Knowledge	Essentials for Practice and Care	Approach to Practice and Care	Personal and Professional Development

VI.   Conclusion

The information presented in this document is meant to be used in combination with the companion paper prepared by the Assessment SIG to facilitate CC and Assessment Committee or other responsible parties with determining how to incorporate and thereafter utilize the 2013 revised CAPE outcomes in regard to enhancing programmatic and curricular outcomes, and the development of corresponding pedagogic and assessment processes.

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24

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Table 1. Useful References for Integrative Curriculum Development

Programmatic Considerations	Goldman, et al.[9]
	Pearson, et al.[3]
	Harden, et al.[10,16]
	Husband, et al.[8]
Curricular Considerations	
Assessment model for integrated courses across the curriculum	Kolluru, et al.[15]
Writing across the curriculum	Watson[17]
IPE across the curriculum	Buring, et al.[18]
Service learning across the curriculum	O'Connell, et al.[19]
Geriatrics	Shield, et al. [20]
Cultural competency	O'Connell, et al.[19]
Professionalism and Ethics	Pearson, et al.[3]
Technology	Aungst[21]
Critical thinking skills	Cone, et al.[22]
Communication skills	Wood, et al[23]
Pedagogic Considerations	
Skills laboratory	Elsayed, et al.[11]
OSCEs and case studies	Barlow, et al.[24]
Learning communities with collaborations	Henriksen[25]
Longitudinal curricular activity with therapeutics	Karimi, et al.[12]
Team Based Learning	Nelson, et al.[26]
Pharmacy applications course series	Wensel, et al.[13]
Cased based exercises for integration	Marshall, et al.[14]
Progression / Retention Considerations	
	Karimi, et al[12]
	Wensel, et al[13]
	Marshall, et al[14]
	Cone, et al[22]
	Barlow, et al[24]
	Nelson, et al[26]
	Ray, et al[27]

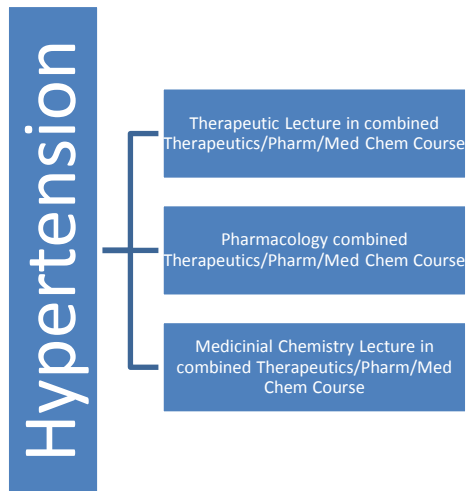|	Begley, et al[28]
	Lucas, et al[29]
	Giligan, et al[30]
	Brown, et al[31]
	Campos-Outcalt D, et al[32]
	Young, et al[33]
	Wijnen-Meijer M, et al[34, 35]

Figure 1: Horizontal Integration

Multidisciplinary (each discipline focused on a common theme but separate lectures)
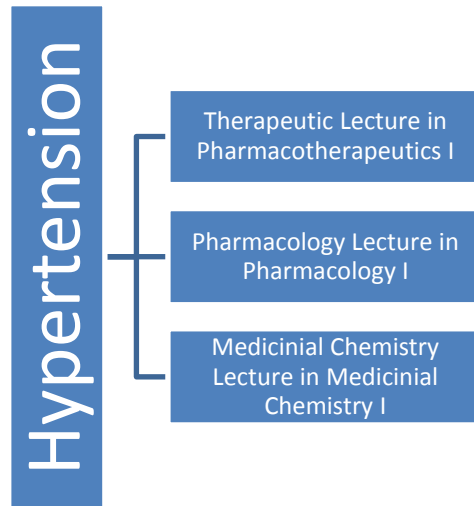
Interdisciplinary (disciplines teach together on a shared understanding of a topic)

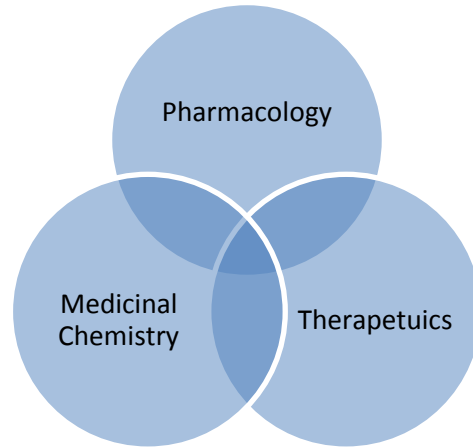*Transdisciplinary (integration is so transparent there is no distinction between disciplines)*
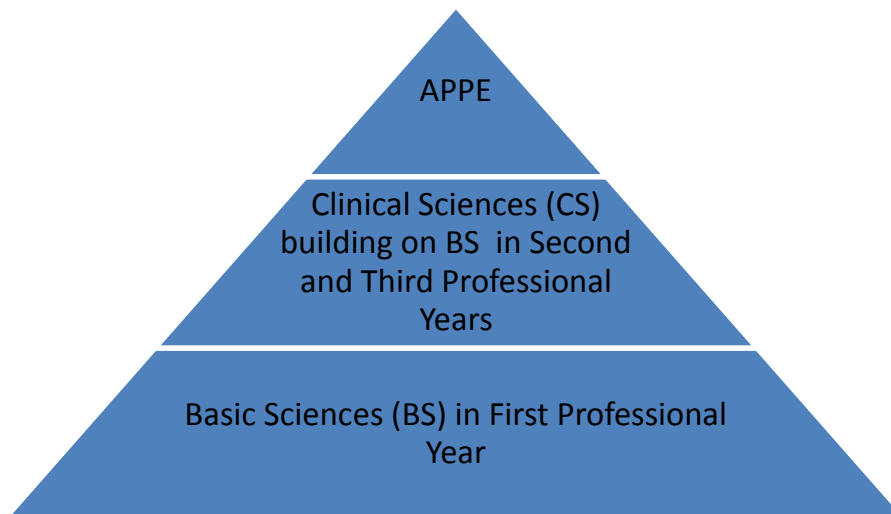

Figure 2: Vertical Integration

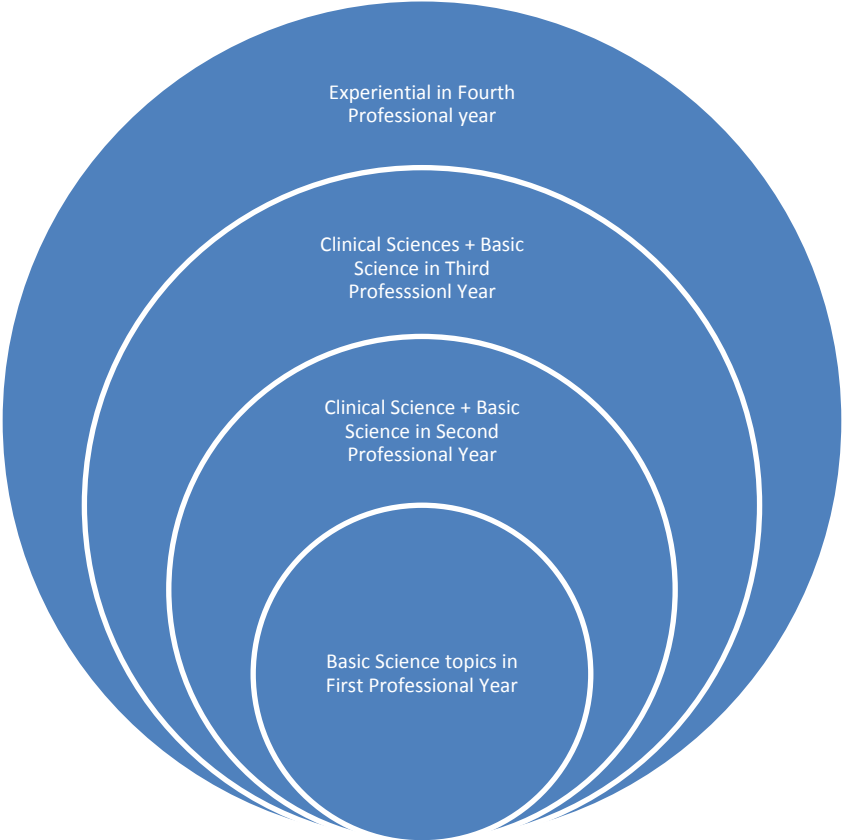**Figure 3: Spiral Integration**

Experiential in Fourth
Professional year

Clinical Sciences + Basic
Science in Third
Professsionl Year

Clinical Science + Basic
Science in Second
Professional Year

Basic Science topics in
First Professional Year

Figure 4: Eleven Steps in the Integrative Ladder

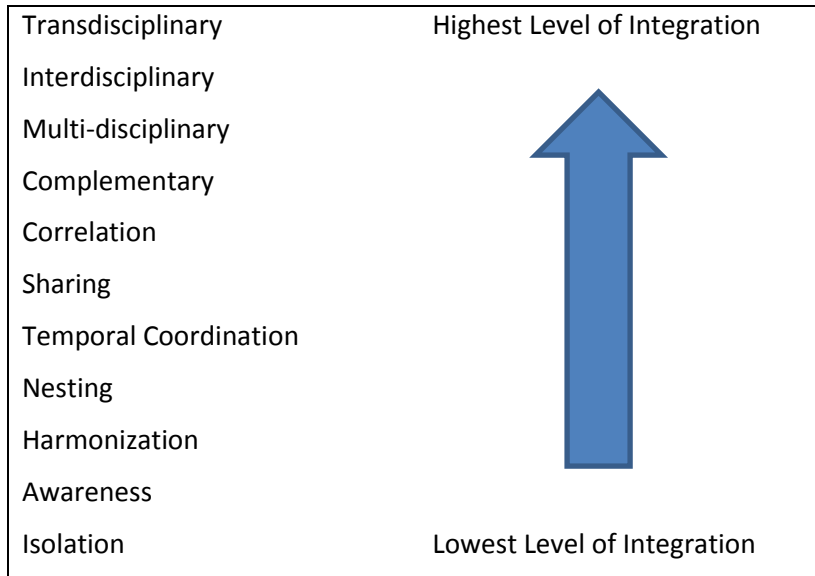|	
Transdisciplinary	Highest Level of Integration
Interdisciplinary	
Multi-disciplinary	
Complementary	
Correlation	
Sharing	
Temporal Coordination	
Nesting	
Harmonization	
Awareness	
Isolation	Lowest Level of Integration

Figure 5: Miller's Pyramid

Does

(Action)

Shows How

(Performance)

Knows How

(Competence)

Knows

(Knowledge)