Development and implementation of an interprofessional education (IPE) curriculum: theory and practice

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Background

In 2006, the World Healthcare Organization (WHO) recognized the worldwide shortage of 4.3 million healthcare workers as the major barrier to achieving the eight Millennium Development Goals (MDG) established by the United Nations (UN). The UN sees the MDG such as poverty, hunger, disease, illiteracy, environmental degradation, and discrimination against women as influencing health and health, in turn, influencing the MDG [1]. The WHO (2020) recognizes that "governments around the world are looking for innovative, system-transforming solutions that will ensure appropriate supply, mix and distribution of the health workforce." They also recognize that interprofessional collaboration showed some promise as a solution. Interprofessional education (IPE) has been identified as a method to develop a collaboration-ready healthcare workforce, capable of maximizing the utilization of existing resources. According to the WHO definition, IPE is an activity when two or more health professions learn with, from, and about each other [1]. IPE is a complex educational modality because of its strong social component. According to the social identity theory [15], learners develop their identity from membership in social groups. In the case of healthcare education, social groups are comprised of healthcare professions. Group membership influences learners' perceptions of themselves and others in different social contexts and affects interactions among them. Learners develop their identity over time, although development is not necessarily linear [2,3,4,5,6,7,8]. During IPE, learners from health professions can develop effective team communication skills that would allow for forming shared mental models, flattened hierarchy, and improved team-based decision making. To achieve these goals, learners must undergo attitudinal transformation, a slow process that takes time.

Similar to any other teaching and learning process, IPE requires certain prerequisites, optimal time to establish and sequence learning activities [9]. Since IPE does not exist in a vacuum it needs to be integrated into existing healthcare programs [10]. In addition to the complexity of developing a successful curriculum, IPE needs to be optimally integrated into many different participating programs and meet the expectations of each specialty's accrediting body. To be effective, IPE curriculum needs to be based on a sound educational theory. Most of the IPE curricula reported in the literature have used an empiric approach [12]; only a few IPE developers have reported using explicit theoretical frameworks [12]. Authors Danielson and Willgerodt strove to contribute to the collective knowledge and improve understanding of the dynamics and mechanisms of developing a successful IPE curriculum that achieves measurable outcomes.

Theory and practice of IPE curriculum design

The IPE curriculum is a curriculum subtype that contains the concepts and frameworks of the program's overarching curriculum but also bears unique features. IPE curriculum design starts with creating an interprofessional working group that has been charged with IPE curriculum development.

Creating an interprofessional curriculum development working group

Creating an interprofessional curriculum development working group is one of the most important steps that influences the success of the curriculum. It is vital to ensure that all of the institution's umbrellaed programs are represented and committed to the process even though, due to logistical reasons, some programs might not be involved in all IPE activities at the same time. In addition to covering the existing spectrum of healthcare professions, the working group should include experts from the following fields: content, education, IPE, assessment and evaluation, simulation, and administration.

Administrative support is important since it can make faculty commitment easier and more successful. It will also facilitate alignment of the newly developed IPE curriculum with the home institution's mission and vision, thereby enhancing its integration into the existing healthcare programs' curricula. All curriculum development team members are equally important since they bring their unique visions and expertise to the process.

Participating program evaluation

The main objective of an IPE curriculum is to enhance the participating programs. Successfully accomplishing this goal requires a thorough evaluation of the existing educational program from both an IPE and a general perspective. During the program evaluation, there are several important points to identify in the existing curricula: successful components, gaps and redundancies, achieved and unachieved goals, and elements of poor design versus poor implementation.

Identifying target audience, educational gaps, and educational needs

It is important for the IPE curriculum development team to identify its target audience and their educational needs prior to developing the content as well as choosing the most appropriate assessment and evaluation instruments. In the case of healthcare IPE curriculum development, the audience is comprised of students from all participating programs. Typically, this audience is very diverse in terms of specialty, degree of professional competency, and stage of professional development. The curriculum development group must establish a good global view of the learners' personal and professional transformation from day one of the program through graduation and transition to practice. This knowledge is instrumental in identifying educational needs, developing learning objectives, and formulating prerequisites for each activity.

Assessing educational needs can be done through surveys, quizzes, direct observation, content expert panels, learner feedback, and literature review. Individually, no single method is superior to the other but using several methods in combination allows educators to mitigate their individual limitations. The entire body of learners should be surveyed to identify relevant professional and cultural trends within the target audience and to determine the optimal time and method of addressing them. Using surveys to obtain information from healthcare supervisors and residency program directors can help assess if graduates meet the expectations of the healthcare environment. Knowing what is expected from learners, helps identify the ideal state of the program.

Quiz administration and analysis is useful to determine the learners' knowledge base. If learner performance deficiencies are identified via direct observation, supervisor surveys, or from learners' feedback, then quiz information can help determine whether the problem is caused by knowledge gaps, difficulties with knowledge application, attitudes or other problems. Altogether, these methods provide information about the current state of the program. The difference between the ideal and current states of a program identifies the educational gap.

Educational gap = [Ideal state of program] – [Current state of program]

An educational gap uncovers the problem that needs to be solved, while educational needs are the required interventions to close that educational gap [11]. Careful root-cause analysis helps develop an optimal strategy to address these gaps. Within the duration of the curriculum, participating healthcare programs may see a varied evolution of educational gaps and needs. This variation will influence the

ideal time to implement an IPE activity. Inappropriate timing of conducting an activity might compromise its effectiveness. This principle can be illustrated with a physiologic analogy: certain cardiac arrhythmias can be converted to sinus rhythm through administering an electric shock; however, administering the electric shock with the wrong timing in the cardiac cycle could worsen the arrhythmia.

A group of researchers from the University of South Dakota Sanford School of Medicine (USDSSOM) conducted an educational needs assessment by distributing a university-wide survey to determine students' readiness for IPE, in order to determine the best time to establish an IPE curriculum [2,3,4]. Surveyed participants included students pursuing medicine, nursing, social work, physical and occupational therapy, and pharmacy. Responders from all programs have demonstrated very similar trends in readiness and attitudes for IPE:

> 1. Interest in IPE was highest in the beginning and near completion of the program.
>
> 2. Perceived degree of the professional identity was highest in the beginning and near completion of the program.
>
> 3. Perceived readiness to teach peers in other professional programs steadily increased during respective curricula.
>
> 4. Perceived readiness to learn from peers in other professional programs was highest in the beginning and near completion of the program.

Later, that project was expanded geographically, and the survey was administered to various healthcare programs in the United States, United Kingdom, Caribbean, Spain, Albania, Romania, and Bulgaria. Regardless of socioeconomic and cultural differences among the countries, the results were similar [5]. Once gaps, redundancies, and educational needs have been identified, the curriculum development group needs to assess if IPE is the most appropriate tool to fill that need.

Generating learning objectives

As mentioned above, IPE has a strong social component. The major goals of IPE should include:

> 1. Developing effective interpersonal and team communication skills.
>
> 2. Overcoming professional hierarchical silos.
>
> 3. Contributing to mutual respect.
>
> 4. Working toward common goals.
>
> 5. Sharing decision-making skills.

These IPE-specific learning objectives are unique in the sense that they have very minimal didactic learning prerequisites. For example, knowledge of human anatomy and physiology, or lack thereof, has little impact on a person's ability to practice effective team communication skills or to delegate responsibilities. Nevertheless, level of knowledge and expertise within a specific field needs to be considered during creation of the content and framework for the IPE activity. IPE-related learning objectives address learner's attitudes, communication, and professional interaction skills that usually occur within a clinical context. Malcolm Knowles stated that learners' engagement greatly depends on their perception of the relevance of the subject [16]. To ensure that IPE-related learning objectives are

achieved, the learning objectives need to be embedded into a clinically relevant and engaging context, otherwise they could be perceived as artificial by the learners, and the credibility of the entire activity would be compromised.

In summary, an effective IPE activity should have two sets of learning objectives, (1) IPE-related and (2) clinical. For example, USDSSOM the University of South Dakota (USD) used this approach in developing an "ICU Bedside Rounding" IPE activity. (1) The IPE-related learning objectives targeted development of effective communication skills needed to achieve the clinical learning objectives. (2) The clinical learning objectives aimed for participants to became familiar with how to manage a patient in the ICU.

It is important to emphasize the difference between the teaching goals and learning objectives. Teaching goals are the instructor's expectations for the activity. Learning objectives and outcomes are what learners need to demonstrate as an indication that the educational needs were achieved. There are several types of learning objectives: cognitive, psychomotor, affective, interpersonal/social.

Interpersonal and social learning objectives are the primary focus in IPE but are only achieved within a framework that other types of objectives create. For example, an operating room patient safety IPE activity requires creating a realistic, immersive environment replicating how real-life patient care occurs.

The Universities of Alberta and British Columbia have identified three stages of IPE curricula [12]:

1. Exposure

2. Immersion

3. Integration

The suggested stages of IPE curriculum mimic Kolb's cycle of the experiential learning [14]:

1. Concrete experience

2. Reflective observation

3. Abstract conceptualization

4. Active experimentation

One IPE-activity can have a combination of different levels of the IPE-related learning objectives. For example, learners might be at an expert level of mutual respect due to their background or beliefs but still require more training in other areas such as effective team communication skills. Such an activity might address the 'mutual respect' learning objective at the integration stage (for example, team addresses a surgery adverse event like a needle forgotten in the abdomen) while the 'team-communication' learning objectives, such as closed loop communication is encountered at an exposure level.

The authors of this manuscript believe that the order suggested by the Universities of Alberta and British Columbia may vary during the curriculum. This statement is supported by remembering the fundamental principle of the constructivism learning theory, which states that any activity or event will be perceived by learners through the prism of prior life experiences, meaning earlier experiences create a background or framework for new experiences. Assuming a learner has successfully acquired a desired behavior, such as effective communication skills, without repeated exposure this learned behavior will degrade over time [17]. Providing an exposure level of an IPE experience to a learner with advanced IPE

knowledge and skills would improve retention. Thus, an exposure-level IPE experience for a learner who has successfully completed his or her integration phase serves as a method of improving retention.

IPE-related learning objectives should be tailored to achieving IPE competencies. In 2011, the Interprofessional Education Collaborative (IPEC) first established a list of Core Competencies for Interprofessional Collaborative Practice, which were updated in 2023 [13]. Formulating learning objectives in IPE activities to demonstrate a learner's success in a given IPEC Core Competency can help with standardization of IPE education.

Developing an assessment instrument.

Once learning objectives are defined, the curriculum development team needs to create an instrument that will determine if the learners have acquired the desired knowledge or skill to satisfy the learning objectives. In other words, the curriculum developers need to design an assessment instrument that measures the learner's ability to perform the task. As discussed, the learning objectives belong to the (1) cognitive, (2) psychomotor, (2) affective, and (4) social domains. Each domain is related to different types of skills and requires different assessment instruments.

1) Cognition is the mental process that takes place in the human brain and cannot be directly measured. Indirectly, it can be assessed with the use of case-specific checklists, quizzes, and interviews. To correctly assess cognitive processes of an IPE activity, an evaluator needs to combine the use of checklists with the participant's interview during the post-activity debriefing. This is important from both the teaching and assessment perspectives, as it helps to establish the correct cause-and-effect relationships during the encounter, prevent faulty teaching, and ensure the correct interpretation of the cognitive decision-making process through the observation of related behaviors. Every assessment instrument should be designed with the assessor's knowledge, skills, and training in mind. Effective collaboration with the assessment specialists, educators, and content experts during development of the assessment instruments is imperative.

Cognitive skills can be measured via multiple choice question (MCQ) quizzes. If time permits, they can also be assessed during a debriefing session. There are several debriefing techniques. Discussion of all of the techniques is beyond the scope of this manuscript and only the facilitated discussion debriefing technique will be reviewed [11]. The facilitated discussion is a debriefing technique during which the facilitator guides the learners' conversation so that the learning objectives are achieved. One benefit of the facilitated discussion debriefing is that it can identify deficiencies in learners' performances, as well as establish their roots. Whether MCQ quiz or facilitated discussion is used, each assessment point needs to be clearly formulated.

2) Psychomotor skills are assessed through a skill-specific checklist in combination with direct observation.

3) Affective domain assessment includes attitudinal changes and learners' satisfaction. Both are usually assessed with surveys.

4) Social skills are the most complex to assess. They involve social and cultural frameworks of the person assessed, other team members the student is interacting with, and the assessor. Case-specific checklist, surveys, and peer-based assessments (aka 360-degree instruments) are used.

Development of the IPE curriculum content

First, IPE curriculum content should be clinically valid and scientifically correct. Designing scenarios based on real patient cases does not always reflect best practice. Involving a panel of experts, using national guidelines, and best practices helps ensure content validity.

Second, the content should be interactive and engaging. As per IPE definition by the World Health Organization, during an IPE activity, participants must teach each other and learn from each other. This assumes interaction and engagement.

Third, critical performance indicators, or expected observable behaviors that comprise case-specific assessment checklists, form a structure of the IPE activity content because they create a reference framework in which participants' expected behaviors take place.

Fourth, the learning objectives and the content of the IPE activity should be developed with the learners' knowledge and expertise in mind. As any other curricular activities, IPE teaching sessions should have well-defined prerequisites. It should also be remembered that each IPE activity serves as a foundation for the next activity. The internal consistency of the entire IPE curriculum is paramount.

Teaching methods used in IPE curricula

For the purposes of this manuscript, the best teaching method in IPE is the one that aligns best to effectively achieve the learning objectives. Although there are many methods, they typically share two key features: interactive and engaging. IPE teaching can be equally effective conducted in academic, simulated, or real patient care environments. Simulation is frequently used to deliver interprofessional education, and it has well-established best practices. Examples of IPE activities that are regularly provided at USDSSOM and in other academic environments include (1) simulation (high-fidelity, skill, combined, and hybrid), (2) standardized patients, (3) problem/patient-based learning (PBL), (4) table-top activities and game, (5) journal club, (6) team-based community service/clinics.

Conducting IPE activities at the patient site can effectively be done without compromising patient's safety. Health fairs are excellent opportunities for students from several professions to work with each other and learn from each other while serving their communities. Examples of IPE at the site of patient care include, but are not limited to, health fairs, grand rounds and bedside rounds.

Tracking and categorizing IPE activities during the programs' curricula can be successfully achieved with the use of the IPE Passport system.

Engaging Students and Increasing IPE Competency through IPE Passport

The Interprofessional Health Education Center (IHEC) of the School of Health Sciences (SHS) at USD was established by the South Dakota Board of Regents in 2017 to provide a coordinating platform in order to improve communication and interaction among professions within the SHS and the Sanford School of Medicine. Since then, IHEC has expanded its reach to include other centers within Health Affairs. The mission of IHEC is to develop scholars, practitioners and leaders in interprofessional education and collaborative care, and through curriculum, deliver scholarship and service learning in order to improve population health.

To frame these goals, IHEC has adopted the Interprofessional Education Collaborative (IPEC) Core Competencies for Interprofessional Collaborative Practice and uses the TeamSTEPPS® framework [18] to help teams understand and define teamwork behaviors.

Learners in the early semesters of their education program engage primarily in exposure IPE experiences, which are designed to assist students in acquiring skills to build a greater understanding of their own professional role in relation to the healthcare team. These learning activities are 'low risk' and are designed to promote peer-to-peer interaction in a variety of topics. Didactic instruction and low-level fidelity simulation are examples of learning at this stage.

As students advance in their IPE journey, they gain confidence in their professional role, as well as their knowledge of the IPE team. During this time, immersion experiences such as case study discussions, high-fidelity simulation, clinical opportunities, and community-based learning in the field are offered. Students begin to critically apply knowledge and to construct new knowledge through dialogue and collaboration which broadens their perspectives and world view.

The duration and intensity of an exposure or immersion activity varies between disciplines and students. These should be combined with 'core' learning activities, where all students in a given program are required to engage in. In doing so, learners gain a more advanced skillset and foundation in IPE and collaborative practice.

Students engage in IPE activities as part of their curriculum. While each department selects the number, frequency, duration, and levels of exposure to these experiences, IHEC recommends a minimum of 3 core activities for each SHS student. The core activities are not required to be the same for all disciplines. Activities are designed to meet student needs, accreditation standards, IPE outcomes, and individual program outcomes. These activities are usually patient-centered, community and population-oriented learning activities, which were designed to engage novice and experienced learners in IPE.

To incentivize student participation in IPE learning opportunities the IHEC Student Passport was developed and implemented in 2018. The passport system tracks individual student involvement by awarding badges following completion of IPE activities. Available IPE activities are categorized into immersion or exposure levels according to the IPE Competencies [13]. Upon receiving three badges, at least one of which must be at the "immersion level", IHEC will issue a certificate of completion. Interprofessional activities are offered at various times and locations throughout the semester and are advertised through an internal website maintained by IHEC. IHEC encourages students who achieve Student IPE Champion status to add the recognition to their CV or resumé.

Curriculum implementation

IPE curriculum development includes a plan for implementation. The most challenging part of IPE is scheduling. As the number of programs participating in an IPE curriculum grows, the challenge of scheduling grows exponentially. To ensure that the IPE curriculum integrates well into each participating program's curriculum its implementation needs to be planned at least 12 – 18 months prior. Part of the IPE curriculum implementation is deciding the amount and frequency of the IPE content delivered. This is one of the least clear aspects of IPE. Continuing with the physiology analogies IPE can be compared to the enzyme that catalyzes a chemical reaction. Each chemical reaction has an optimal substrate-to-enzyme ratio. IPE curriculum should enhance the healthcare programs in preparation of a collaborative

practice of providers. The amount, type, and frequency of required IPE often depends on the local culture and the initial level of IPE competency that the learners' have. For example, a panel discussion at the International Network for Healthcare Workforce and Education 2019 (INHWE) in Dublin revealed a significant difference in interprofessional cultures among various parts of the United States and Europe. Such differences greatly affect all aspects of IPE curricula including its implementation.

Translation of IPE curriculum to healthcare practice

Assessment of how successfully knowledge and skills translated from academia to healthcare practice is the most challenging type of assessment. The main challenge is that educators and assessment specialists lose access to their learners after graduation. The second factor is that successful integration into a healthcare team requires learners to assimilate and integrate into the local culture. For example, in 2006-2008, the Louisiana State University Health Sciences Center conducted a two-year operating room (OR) IPE training funded by the Agency for Healthcare Research and Quality (AHRQ) at two rural hospitals. Both hospitals were initially skeptical regarding the training, but later on, one fully embraced the IPE ideas and continued with the education for its personnel after the training grant was completed. With the same IPE training, the other rural Louisiana hospital revealed and potentiated the dormant tensions among several OR specialties, this prematurely ended the project [19,20]. This example reflects how local culture may dictate the translational outcome of IPE, which poses a challenge of accurate assessment post-graduation.

Conclusions

Interprofessional education curriculum development is similar to developing a curriculum in general. Nonetheless, it has specifics dictated by its significant social component. Curriculum developers would do well to remember that IPE plays the role of a catalyst. The goal is to shape healthcare providers' behaviors to interact with each other and the patient in a way that is most beneficial for the patient and the healthcare system. If the enzymatic reaction is working at an optimal rate, there must be an optimal ratio between IPE and the overall curriculum, in a supportive educational environment acting as the buffer.

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