Development of the Proposed Solutions to Implement SPICES Model Strategies in Iranian Undergraduate Nursing Curriculum

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Abstract

Background: SPICES model is one of the most popular strategies to assess, review, and modify curriculums. The objective of the present study was to determine SPICES model implementation in undergraduate nursing curriculums in Iran, Canada, and Australia and suggest solutions for the Iranian undergraduate nursing curriculum.
Methods: This comparative study was conducted in 2019 using the Brady Model that includes description, interpretation, juxtaposition, and comparison. Ten top universities from the United States, Australia, and Canada as well as Iran were selected according to purposeful sampling. The curriculums of these universities were examined considering six strategies of SPICES model (i.e. student-centered, problem-based, integration, community-based, elective, and systematic).
Results: According to the implementation procedure of this strategy in famous universities, there are solutions to implement six strategies of SPICES model to modify and review the Iranian nursing curriculum.
Conclusion: According to the successful experiences of top nursing schools in the implementation of SPICES model, modification in nursing curriculum is essential considering the needs of the society and facilities.
Keywords: NURSING CURRICULUM, SPICES MODEL, IRAN

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Introduction

Teaching is a purposeful and dynamic process to create and promote learning (1). Consistent with continuous changes in the healthcare system, nurses have to acquire necessary skills to provide high-quality care (2). In this regard, the importance of nursing education for professional evolution and ensuring high-quality care for patients is essential. Therefore, the curriculum should be comprehensive and consistent with the needs of the health system. To satisfy the needs of the society, it is required to develop new curricula and modify them (3). Harden and colleagues proposed six innovative educational strategies (i.e. student-centered, problem-based, community-based, elective, systematic, and integration) as SPICES model that is known as one of the most important strategies in modern medical education system (4). In this model, we have modern approaches and old teacher-based approaches, information gathering, discipline-based, hospital-based, standard program, and apprenticeship-based (5). SPICES model is a well known framework to assess, review, and modify curriculum. SPICES strategies are executive strategies in learning

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and teaching process, which nursing schools try to implement them (6). Most of famous nursing schools such as Ohio, John Hopkins, Stonehenge, Western, Sydney, and Chamberlain have changed their curricula based on SPICES model to match the current needs of medical education (7). In Iran, in 2007, Shahid Beheshti University of Medical Sciences modified its medical curriculum based on SPICES model (8). Different faculties have employed various and innovative approaches according to the resources and facilities. Awareness of curriculum and implementation of this model in different countries can provide an opportunity to modify curricula according to obtained information and identified weaknesses and strengths (5). To have more successful undergraduate nursing curriculum in Iran and identify its weaknesses and strengths, comparative studies and the results obtained from studies can help curriculum developers to design and modify curricula consistent with the needs of their society with a broader look (9). According to the historical documents of nursing in Iran, Iranian nursing has been influenced by the United States, Australia, and Canada (10). Therefore, according to the importance of SPICES model implementation in curriculum and its consequences, this study was conducted to determine the application of SPICES model strategies in undergraduate nursing curricula in the United States, Canada, Australia, and Iran and propose solutions to operationalize it in Iranian undergraduate nursing curriculum.

Methods

The present study is a comparative study according to the Brady Model that has examined the implementation of SPICES model strategies in higher nursing schools in the United States, Canada, and Australia and compared them with Iran. In the end, suitable solutions to implement this model in the Iranian undergraduate nursing curriculum are presented. The Brady Model includes four stages of description, interpretation, juxtaposition, and comparison (7, 9). In the present study, in the first stage (description), information about the curricula of top nursing schools in the three countries of interest was gathered. In the second stage (interpretation), information obtained according to different stages of SPICES model strategies was presented. In a study by Changiz and Yousefy (11), information obtained from curricula of the universities of interest was examined and interpreted. In the third stage (juxtaposition), similarities and differences of different curricula regarding the implementation of SPICES model strategies were characterized and classified. Finally, in the fourth stage (comparison), executive solutions to implement these strategies in curricula were compared to propose solutions for the implementation of this model in Iranian nursing curriculum.

In this study, the statistical population included documents of undergraduate nursing curricula in different countries. A total of 10 nursing schools from top universities that are among the most successful schools in the application of SPICES model, as well as Iran were selected by purposeful sampling method. Nursing schools in Iran follow American nursing education. In addition, Western and Mount Royal in Canada have a global look toward nursing and train nurses with interdisciplinary views (10). Also, Australian nursing schools have been successful in the application of SPICES model. For instance, the Sydney Nursing School received Vice-Chancellor's award in 2013 with an excellent nursing education degree (3). Nursing schools in the United States include Ohio, John Hopkins, Stonehenge, Purdue, and Chamberlain. In Australia, the schools include Sydney and Queensland and in Canada include Western and Mount Royal. Using databases in the global internet networks, websites of universities, Medline, Eric, library resources, and official reports by countries in congresses and conferences and review of previous studies, necessary information was gathered. Data about the countries of interest were summarized and classified in comparative tables and were compared and analyzed. Then, according to the similarities and differences,

suitable solutions to develop and review the Iranian undergraduate nursing curriculum were proposed. The SPICES model strategies are described in the following.

Student-Centered Strategy

Stage 1: There is no assurance or emphasis about considering students' needs and preferences.
Stage 2: The coordinator considers needs and preferences according to his/her decision and informs students, but students follow the same procedure.
Stage 3: The coordinator considers the courses, needs, and preferences according to his/her decision and informs students. Students are responsible for implementing the program and activities in the learning/teaching process.
Stage 4: Students actively participate in the planning stages as they participate in the execution phase.
Stage 5: Students actively participate in all stages (i.e. planning, execution, and assessment) (11)

Integration Strategy

Stage 1: Educational courses are separated in terms of objective, content, instructors, and methods.
Stage 2: Coordinations are made between interrelated courses as students are informed about other courses.
Stage 3: Coordination between courses is deeper as temporary coordination or continuous training. It means that different fields have similarities in content, assessment, and courses.
Stage 4: The boundaries between fields of studies are vanishing. A comprehensive plan or multidisciplinary course is implemented to place problems or issues at the learning center.
Stage 5: Fields of studies are interrelated and are implemented as interdisciplinary (11).

Systematic Strategy

Stage 1: The descriptions of courses (i.e. objectives, content, methodologies, and assessment) are not available for students.
Stage 2: Courses (i.e. objectives, content, methodologies, and assessment) are described for students.
Stage 3: In addition to previous cases, the content of courses and assessment of students are related to the objectives.
Stage 4: The objectives are according to the assessment requirements. This stage includes the previous cases.
Stage 5: Assessment is done during the period and suitable feedback exists (11).

Community-Based Strategy

Stage 1: Courses do not have any relationship with the problems of the community. They even do not have any relationship with the common problems of third level care.
Stage 2: Courses focus on the problems of third level care (hospital-based).
Stage 3: Courses, in terms of objectives and resources, focus on the community.
Stage 4: Courses are both community-based and community-oriented. Therefore, the learning environment and consequences are related to the real status of the community.
Stage 5: Courses are interrelated and are implemented as an intradisciplinary mode. Themes are the central part of curriculum organization (11).

Problem-Based Strategy

1: General rules and facts are instructed without any example of the applications.
2: Executive rules are instructed but there is no plan for implementation.
3: Examples or problems are taken into consideration with the applied rules. These examples are presented before and after instruction to simulate the mind.
4: Problem solving is at the center of the activities. Problems are instructed without any inferential activity or inferential rules are used for the same problems (11).

Elective Strategy

1: According to the high volume of information, it is evident that students cannot learn everything. The solution to this problem is elective strategy. In standard curriculum, students have to learn

a series of topics while in elective curriculum, students have the right to select several items voluntarily. The benefits include increased responsibility in learning, providing the needs of students, and changing their attitudes (12). This strategy includes five stages:
Stage 1: The curriculum is absolutely mandatory.
Stage 2: Students can select a consultant, time schedules, and exam dates.
Stage 3: In addition to previous items, students select some exam questions and resources.
Stage 4: The titles of some courses are elective, like the arrangement of courses and assessment methods.
Stage 5: Students select the learning method as well (11).

Results

In the first stage, the information about the implementation of SPICES model strategies in nursing schools in the United States, Canada, and Australia as well as Iran was gathered. In the second stage, information gathered from the universities was interpreted and in the third stage, comparative tables were drawn to compare similarities and differences. The summary of the first three stages is presented in table 1. In the fourth stage, suitable executive solutions for the Iranian nursing curriculum are presented (table 2).

Discussion

This study aimed to determine the implementation of SPICES model in undergraduate nursing curricula in the United States, Canada, Australia, and Iran and propose solutions to operationalize them in the Iranian undergraduate nursing curriculum. The results of this comparative study showed that these universities had taken serious steps to implement the strategies of this model. Brauer and Ferguson stated that SPICES model was among the most famous strategy sets in modern educational system. This model can be used to develop a new curriculum or modify

Table 1: Classification and comparison of activities in the universities of interest to operationalize SPICES model

Universities	SPICES model component	Implementation strategies
Ohio	Student-centered	Making the students responsible for learning, paying attention to the learning level of the student, predefined assessment criteria, interaction between students, independent studies, mentorship program, student organizations, global-level professors. Stage 5: Student-centered (7).
	Integration	Formation of interdisciplinary teams, the existence of knowledge or clinical integration, horizontal or vertical integration. Stage 5: Integration (13).
	Systematic	The presence of advisors, accept conditions and purposeful conditions and competition among students, assessing the performance of graduates, mentorship program, electronic portfolio system, audit system. Stage 5: Systematic (9).
	Community-based	Participation in community, the existence of the nursing learning community, existence of three learning programs outside the university, attention to the needs of the community in drawing the objectives, teaching in community centers. Stage 4: Community-based (10).
	Problem-based	The content of courses according to the risk factors and comprehensive problems. Stage 3: Problem-based (11).
	Elective	Minor courses, technical courses. Stage 4: Elective (10).

Universities	SPICES model component	Implementation strategies
John Hopkins	Student-centered	Nursing research center, mentorship and preceptorship, new magazine publication, participatory learning, accessible resources, black students nursing community, attention to the previous level of the students. Stage 5: Student-centered (14).
	Integration	Multidisciplinary learning, vertical and horizontal integration, transferring the courses to professional activities. Stage 5: Integration (15).
	Systematic	Accept committee, receiving students' comments about the curriculum. Stage 5: Systematic (9).
	Community-based	Community health nursing, global nursing center, community services, departments according to the needs of the community. Stage 5: Community-based (10).
	Problem-based	Instruction according to the clinical scenario, problem-based projects, learning while servicing. Stage 5: Problem-based (10)
	Elective	Follow-up program, student seminar. Stage 4: elective (10)
Purdue	Student-centered	Permanent learning center, participatory learning process, variety in teaching methods, attention to learning styles of students, analyzing the relationship between professors and students, transferring responsibility to the student. Stage 5: Student-centered (7)
	Integration	Interaction with other faculties, participatory learning and teaching, horizontal and vertical integration. Stage 5: Integration (16).
	Systematic	Competitive registration and patient-centered. Student accept committee decision. Stage 3: Systematic (9)
	Community-based	Two nursing clinics are managed by senior students. Outdoor studies, learning while working. Stage 4: community-based (10)
	Problem-based	Integrated seminar, learning while working to eliminate the health problems of the community. Stage 5: Problem-based (7)
	Elective	Elective courses. Stage 2: Elective (10)
Notre Dame	Student-centered	Different teaching methods, students' guidelines, awareness of time schedule. Stage 3: Student-centered (7)
	Integration	Vertical integration, horizontal integration in anatomy and physiology. Stage 4: Integration (16)
	Systematic	Presence and absence rules, technical instructors in terms of clinical mentor and lecturer. Stage 3: Systematic (9).
	Community-based	The course about the relationship between people and natives of Torres Strait Island, outdoor study Capstone units. Stage 4: Community-based (10)
	Problem-based	Integrated seminar, learning while working to eliminate the health problems of the community. Stage 5: Problem-based (10)
	Elective	Elective clinical internship, change in curriculum. Stage 2: Elective (10).

Universities	SPICES model component	Implementation strategies
Chamberlain	Student-centered	The student is responsible for learning, attention to the earning styles, empirical learning, computer-assisted center, selecting suitable preceptor, student consultation board and receiving feedback. Stage 5: Student-centered (7)
	Integration	Vertical integration, horizontal integration in anatomy and physiology, interdisciplinary studies. Stage 5: Integration (16).
	Systematic	Main capabilities in competency-based teaching, registration criteria and conditions, participation in curriculum review, clinic entrance conditions, the presence of clinical coordinator. Stage 5: Integration (9).
	Community-based	Capstone units. Stage 4: Community-based (10)
	Problem-based	Reflective writing, case studies, scenarios in teaching methods, evidence-based project. Stage 3: Problem-based (10)
	Elective	Curriculum in all seasons, humanity, history, and capstone units. Stage 2: Elective (10).
Aston	Student-centered	Portfolio at the end of the academic year, the student is responsible for professional promotion, various teaching, methods, empirical learning, independent studies, mentorship, preceptorship. Stage 5: Student-centered (7)
	Integration	Interdisciplinary teaching, horizontal and vertical integration, Stage 5: Integration (16).
	Systematic	Registration conditions, a ceremony for freshmen, comprehensive exam, clinical conditions, awareness of scoring system, nursing student society. Stage 5: Systematic (9)
	Community-based	Travel as a book, healthcare marketing. Stage 3: Community-based (10)
	Problem-based	Teaching based on clinical scenarios, problem-based projects. Stage 4: Problem-based (10)
	Elective	Spirituality and language units, clinical service unit in the summer and independent studies 1, 2, and 3. Stage 4: Elective (10)
Sydney	Student-centered	Variety in teaching and assessment, learning and teaching committee, transferring learning responsibility to students, student scholarship. Stage 5: Student-centered (7)
	Integration	Horizontal and vertical integration, professional clinical experience in the first semester, methodology and interdisciplinary professors. Stage 5: Integration (16).
	Systematic	Consultants and coordinator in the management team, purposeful registration, learning experiences control, graduation effect control. Stage 5: Systematic (9).
	Community-based	Community health unit, clinical examination outside the faculty, community-based projects, mental health committee. Stage 4: Community-based (10).
	Problem-based	Clinical assay exam, health policies unit, case study, conceptual map. Stage 5: Problem-based (10).
	Elective	Elective clinical internship, change in curriculum. Stage 2: Elective (10).

Universities	SPICES model component	Implementation strategies
Queensland	Student-centered	Preceptorship plan, study opportunities, student preparing programs. Stage 3: Student-centered (7).
	Integration	Vertical and horizontal integration, internship from the first semester, multidisciplinary and interdisciplinary learning. Stage 5: Integration (16).
	Systematic	Receiving feedback from students, full unit description, assessment methods related to the objectives, encouraging program to teach skills. Stage 5: Systematic (9).
	Community-based	Care studies and service promotion center, attention to health consequences in the society, electronic nursing and midwifery studies. Stage 4: Community-based (10)
	Problem-based	Teaching according to case-based scenarios, problem-based sessions and clinical laboratories. Stage 5: Problem-based (10)
	Elective	Various assessment methods, third year with an emphasis on technical student selection in certain areas. Stage 4: Elective (10)
Western	Student-centered	Participatory model in teaching, preceptorship plan, attention to different needs of students, mentorship teaching method, learning responsibility for students, two participatory teaching programs, student organizations, the participation of representatives in assessments. Stage 5: Student-centered (7)
	Integration	Participatory teaching model, multidisciplinary teaching and learning, vertical integration in anatomy and physiology, integration of clinical centers with the faculty. Stage 5: Integration (16).
	Systematic	Competitive registration, allocation of resources according to the portfolio, entrance conditions and having confirmation for drug prescription and cardiovascular resuscitation, classified objectives during education, student promotion program, ethical rules, preceptorship coordinator and clinical center. Stage 5: Systematic (9)
	Community-based	Fixing community health problems, variety in services, cooperation between community health nursing center and faculty, health instruction according to the health promotion model. Stage 4: Community-based (10)
	Problem-based	Standardized clinical teaching method. Stage 4: Problem-based (10)
	Elective	Preserved right to continue or stop the procedure, awareness of objectives and assessment methods, choosing physiology or religious studies. Stage 4: Elective (10)

Universities	SPICES model component	Implementation strategies
Mount Royal	Student-centered	General education for future life, web-based units, student service center, empirical learning. Stage 3: Student-centered (7)
	Integration	Vertical and horizontal integration. Stage 1: Integration (16)
	Systematic	Different learning locations to acquire different experiences, participatory success, job promotion team. Stage 2: Systematic (9)
	Community-based	Involvement in the environment and society, attention to health. Stage 4: Community-based (10)
	Problem-based	Study in the field. Stage 5: Problem-based (10)
	Elective	Technical choices in one nursing area, choosing chemistry, physics, or science. Stage 2: Elective (10)
Iran	Student-centered	The employed strategy is teacher-centered. Preceptorship and mentorship plans are just started and we hopefully expect suitable procedure (7).
	Integration	In the University of Tehran, the units are separated in terms of objectives, content, professors, and methods. Nursing independently develops its plan. Stage 1: Integration (16)
	Systematic	Students are registered according to other fields, units are concentrated. Ceremony for freshmen, access to descriptions, clear areas of interest of professors, ethical rules in the faculty. Stage 2: Systematic (9)
	Community-based	Community health, adults nursing course, community-based nursing is developing. Stage 2: Community-based (10)
	Problem-based	Scenario plan by professors while teaching, use of modern teaching methods such as problem base learning has been taken into consideration. Some professors use this strategy but it is not mandatory. Stage 2: Problem-based (10)
	Elective	130 mandatory and elective units. Stage 1: Elective (10)

Table 2: Suitable solutions to implement SPICES model in Iranian nursing curriculum

Areas	Solutions
Student-centered	1. Informing students about rules, changes, and educational progress. For this purpose, a celebration for freshmen is used. To inform students about changes, magazines, newsletters, and e-mails should be used and finally to inform students about educational progress, reports and feedback should be used. 2. Independent student research centers: for research opportunities and acquiring experiences research centers can be helpful. 3. Use of new assessment and teaching methods: attention to individual needs of students and their previous level, and mentorship, preceptorship, participatory learning, and assessment through portfolio can be used. 4. Flexible curriculum and its review according to the needs of students: through facilitating the relationship between students and professors, management, and committee members. 5. Attention to educational consequences: Being student-centered without considering the consequences will not be fully helpful. Defining educational consequences and preparing necessary facilities to achieve them is necessary. Also, defining the capabilities of graduates and following them through acceptable scorings (14, 17)

Integration	1. Horizontal integration: the faculty should try to integrate the related units to achieve this goal. For example, horizontal integration in anatomy and physiology. 2. Vertical integration: A. Integration of theoretical and clinical units. Incorporation of information in courses does not mean integration for learners. B. Students visit hospital in the first semester as a clinical experience unit. C. Participatory teaching: multidisciplinary and interdisciplinary teams should be set up. For example, in cardiovascular topics, several faculty members can be used. Units related to drugs, heart surgery, and nutrition should be instructed by experts. 4. Cooperation and coordination between all faculties create a sense of participation (18, 19).
Systematic	1. Systematic curriculum: accept conditions, purposeful choice, and competition. 2. Systematic learning and teaching: main capabilities in competency-based teaching, classified objectives during education, ethics, controlling learning experiences, undergraduate nursing mentorship, supervision over hospitals, different learning places to obtain learning experiences, more experienced teachers to coordinate preceptorship and clinical centers, clear areas of interests of professors, the presence of representatives in decision-making committees to receive feedback from students about professors and curriculum. 3. Systematic learning and teaching consequences: controlling the effects of graduation and confirming the learning achievement through examining the performance of students, standard assessment methods, student progress assessment, electronic portfolio system, comprehensive exam, relationship between assessment method and objectives, exam to enter the next levels for graduates, job promotion team and creating graduate society (9, 20)
Community-based	1. Attention to community-based condition through fixing health problems: community with valid nursing services by students through participation in clinical scientific services. 2. Attention to community-based condition in curriculum: attention to the needs of community in drawing the objectives and courses, focus on health instead of disease, outdoor learning programs, community-based projects, involvement in the environment and community, clinical exam outside the faculty, formation of groups interested in elderly, creating primary care centers and care in the house and educating students with these objectives. 3. Attention to community-based conditions in research: Creating research center to promote marketing services in healthcare, and electronic nursing studies (5, 21).
Problem-based	1. Learning and teaching methods: teaching based on clinical scenarios, learning while servicing to fix health problems, problem-based sessions, field studies. 2. Assessment methods: problem-based projects according to the evidence from outside the faculty, case studies and rehearsal exam, clinical essay exam (17, 22)
Elective	1. Possibility to select courses: such as religious studies, spirituality, clinical services in summer. 2. Possibility to select curriculum: such as normal and intensified, change in the curriculum with the approval of the advisor. 3. Technical choice: within a specific area such as elective clinical internship and follow-up program and to become a mentor in nursing. 4. Variety in assessment methods: choosing an assessment method to show maximum capability (10).

the existing curriculum (12). In this regard Changiz and Yousefy designed a theory-based questionnaire according to SPICES model and concluded that for modification and assessment, six strategies of SPICES model were used (11). Dent in his study on the improvement of new educational opportunities in outpatient centers stated that to create a new innovative curriculum and learning opportunities, SPICES model was needed. He suggested that a curriculum should be drawn on the spectrum of this model and according to the capabilities and facilities, it should be determined which strategy can be implemented better. Therefore, each faculty may use one or more SPICES model strategies in the curriculum (21). Various universities have modified their curriculums according to SPICES model. The Medical University

of Makerere in Kampala has modified its curriculum according to SPICES model over a participatory process in various sessions with the assistance of people from various fields of study (3). Several researchers have investigated one or several dimensions of this model. Karimi and Khorashadizadeh in their comparative study on the implementation of student-centered strategy concluded that there were many solutions to implement this strategy in undergraduate nursing curriculum in the top nursing schools and attention to their localization could promote undergraduate nursing curriculum in Iran (7). In this regard, Kharashadizadeh and Karimi in their comparative study on the implementation of systematic strategy concluded that this strategy was according to curriculum design considering the existing conditions of the society (9). Kiguli-Malwadde and colleagues in their study on the assessment of the curriculum of the faculty of medical sciences according to the needs of the society stated that SPICES model enhanced educational standards of students and made them consistent with international standards. In Iran, it is recommended to investigate the strategies of this model in interventional studies (23).

Conclusion

According to the successful experiences of top nursing schools in implementing SPICES model strategies, it is necessary to consider facilities and needs of Iranian society and employ different and innovative approaches to take effective scientific steps and enhance curricula.

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