

Developing a Modular Educational Framework and its Applicability in Clinical Education

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Abstract

Background and purpose: The purpose of the study was to evaluate the present situation of modular education, to develop a modular educational framework for higher education and to consult its applicability in clinical education

Methods: An introspective analytical descriptive study was conducted to identify the indices of modular educational framework which was used as a template to evaluate the present and ideal situations of modular education. The participants were all lecturers and authorities in modular education who rated the present situation and the ideal situation of modular education based on a five scale criteria. Field observations and interview with the authorities were also conducted to probe the present and ideal situations in more details. The final modular educational framework was presented for consultation with authorities in modular education and experts in clinical education.

Results: The modular educational framework was developed in 11 scales and 110 subscales. The present situation was moderate only in planning scale. In all the other scales and subscales, the present situation was rated significantly lower than the ideal situation. Clinical experts in health education had consensus over the applicability of MEF in the clinical education.

Conclusion: The developed framework is recommended for designing, implementing, evaluating, managing, accrediting and reengineering of modular instruction. The framework is also applicable in clinical education

Key words: MODULAR EDUCATION, MODULARITY

Journal of Medical Education Summer and Fall 2007; 11 (3,4): 77-84

Introduction

A shift in students' preferences from conventional education toward modular education in the past two decades has encouraged higher education authorities to rethink the education they are providing for their students (1). A number of new universities with modular education has emerged all over the world and the existing universities have moved

to establish degree courses based on modular education (2).

The modular theorists argue that human mind, at least in part, functions in modular format which is domain specific (3). According to this theory, the skill one learns in one domain may not be accessible to another domain. Thus the modular theorists challenge the idea that studying one discipline necessarily improves and strengthens the mind and this strength is transferable to other disciplines or may be called upon in daily life decisions. They argue that teaching critical thinking, for example does not necessarily mean that this skill, when acquired,

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be available when studying mathematics or other disciplines, or in another word, such skill may not be generalized to other content areas (3). Apart from the idea of modularity of mind, modularization is greatly influenced by teaching and learning approaches which regard education as student centered, drawing greatly on methods of adult education, action learning, mastery learning, competency based education, and facilitation theories.

Considering the theoretical underpinning of modularization, modular education is formed around educational packages called modules consisting of around 7 to 12 credits (4). Each module is complete and independent and can be put together with other modules to form a degree award similar to building blocks. Thus, modularization provides the students freedom to choose among the modules and flexibility to organize a combination of them according to their own needs or professional preferences (5). The students in modular education can leave education as long as they wish while still they can come back to education and pass successfully a few more modules at a more convenient time. The modules they have passed years ago can be accounted when decisions of degree awards are made by the educational board of the university (6). This has provided attraction for a number of students, such as those who were at a job and were seeking further practical skill-based education, those who could not cope with conventional strict education, those who wished to see the relevance of what they are studying to the jobs in community, and those who favor more flexibility in education. We believe that this flexibility and skill based approach in modular education may resolve the old educational dilemmas of the gap between theory and practice, of passiveness of students in education, of unemployment after education, of inflexibility in educational degree courses, of students dropping out of universities or even not getting a chance to enter one due to inability to conform to the conventional education which does not, in many instances, appreciate individual differences among them.

The shift toward modularization of education has

warranted universities with conventional educations to provide theoretical modular educational frameworks as well as the relevant regulatory frameworks to facilitate this transition (7). While modular education has been ascertained in Iranian higher education for the past twenty years, little has been conducted to evaluate the system and to provide a general modular educational framework with the consensus of the relevant authorities. However, modularization has not been recognized in medical education, largely due to the separation of medical education from higher education after the Iranian integration of medical education and health services. Thus the purpose of the present study was to evaluate the Iranian modular education, to develop a modular framework for higher education and to examine the applicability of the framework in clinical education.

Methods and Materials

This was an introspective analytical descriptive study conducted to evaluate the present situation of modular education, to develop a modular educational framework for Iranian higher education and to check its applicability in medical education.

The data was collected in seven phases. Phase one was a search in the literature of modular education in the world and Iran to develop the preliminary modular educational framework. Phase two was to use the developed modular educational framework as a template to evaluate the present and the ideal situations of the Iranian modular education. Phase three was field observation of the modular instructional classes and modular educational environment. Phase four involved interviewing the higher education authorities about the pros and cons of the present situation and how to get to the ideal situation. Phase five was to put the results of all four previous phases into the final modular educational framework. Phase six was to consult higher education authorities regarding suitability of the framework in higher education and the degree of consensus. Phase seven was to seek medical

university lecturers' consensus over the applicability of the final modular educational framework in clinical education.

The phase one: Developing the preliminary modular educational framework (MEF)

The preliminary MEF was developed following a comprehensive review of the literature on modular education and also an in depth study of all the documentations, pamphlets and the records of the regulations in both the Iranian Ministry of Cultural and Higher Education and the affiliated modular universities. The preliminary MEF was composed of nine major categories, the planning, the modular features; the implementation; the student admission; the feedback; the evaluation; the management; the reengineering and graduation(4,6,7,8). However, In the first phase of analysis, only the following categories of the preliminary framework were sent for evaluation: the planning with 17 indices, the dimensions and features of modularization with 11 indices, implementation with 13 indices, student admission with 5 indices, feedback with 6 indices, evaluation with 10 indices, management with 7 indices, reengineering with 7 indices, and graduation with 5 indices.

The phase two: evaluating the present and ideal situations of modular education

The preliminary MEF was used as a template and sent to 200 authorities and lecturers in five modular universities selected randomly in Iran. The universities were located in the following provinces: Tehran, Hormozegan, Kermanshah, Gilan, and Khorasan Razavi. Of these, only 96 questionnaires were returned. The questionnaires were filled by 36 female and 60 male participants, of which, there were 56 lecturers, 14 technicians and 25 authorities. On each margin of the template, five spaces were provided to indicate the present or ideal situation, in that, one was considered unacceptable or very weak and five as completely acceptable or very good. On the right margin of the template, the participants indicated their opinions about the present situation of modular education in the country and on the left margin of each item, their opinions about the ideal situation.

The phase three: field observation

Certain classes in modular university in Tehran were randomly selected for field observation. The preliminary MEF was again used as template to evaluate the actual situation. The researcher participated in 10 randomly selected classes for 5 sessions each. The students and the teachers did not know about the aim of the study and the researcher was even regarded as a new student. The researcher also observed the educational atmosphere and facilities. Any observations which could lead to the refinement of the preliminary MEF were recorded on an observational diary.

The phase four: interviewing the authorities in modular education

The researcher interviewed 25 lecturers and authorities in modular education. The participants were free to talk about any aspect of modular education. They were all encouraged to talk about the pros and cons of the present situation and were asked to provide us with their insights into the betterment of the situation. Each interview lasted between one to two hours.

The phases five and six: finalizing the MEF and seeking consensus among professionals

Following the phases one, two, three and four, there were certain changes to the preliminary MEF. Two more categories were added: the philosophy and the objectives with 7 subscales and the theoretical grounds with 7 subscales. The other indices in each scale were also refined which are presented in the results. The finalized MEF was discussed with 14 professionals and authorities, 12 males and 2 females, aged between 44-56 working in modular education.

The phase seven: seeking consensus among health education professionals

The last stage of analysis was to consult with 14 health education lecturers, 8 males and 6 females aged between 46-59, to evaluate the applicability of the finalized MEF in clinical education. The participants were all specialized in different fields of health education and were approached during their teaching hours in three medical universities in Tehran: Shaheed Bheshti University: Medical School, Iran Medical University and Azad

Medical University.

Results

To examine the present situation of modular education, each scale in preliminary MEF with all its indices were analyzed. The analyses were carried out between the average scores given to each item with the average of three (the scale was from 1-5 with the mean as 3). The mean score of below three, if significant, was considered poor or unacceptable and the mean score of above three, if significant, was considered very good or acceptable.

As table 1 indicates, except student admission scale, all the other scales are below the average of three (P< 0.05). Thus we can conclude that except student admission policy all the other indices are rated as unsatisfactory or unacceptable.

The results of the ideal situation of modular education, as summarized based on the nine

major categories are presented in Table 1. All the nine scales were significantly rated above the average (3) confirming the importance of each of the scales in ideal situation.

The results of the comparison between the present situation and the ideal situation showed that all the nine scales are rated below the ideal situation and there were significant differences between them (Table 1). While the student admission with all its subscales was above the average in analyzing the present situation, there were still significant differences between the present situation and ideal situation.

The results of the field observation and the interview with professionals in modular education led to further refinement and improvement in MEF. The finalized framework with all the scales and subscales (indices) after being approved by the professionals in modular education is presented below.

The framework was used as a template for consultation with medical experts who were

Table 1. The results of the comparison between the present situation and the ideal situation of the modular education

Indices	The present and the ideal situation				
	Situation	Mean	SD	t	p
General designing of modular systems	Present	2.35	0.54	22.89	0.01
	Ideal	4.30	0.52		
Features of modules	Present	2.33	0.71	24.09	0.01
	Ideal	4.38	0.61		
Components of modules	Present	2.46	0.60	30.82	0.01
	Ideal	0.42	4.25		
Student admission	Present	3.20	0.76	29.80	0.01
	Ideal	3.90	0.73		
Feedback	Present	2.19	0.74	26.58	0.01
	Ideal	4.38	0.52		
Evaluation and accreditation of materials	Present	2.28	0.69	18.03	0.01
	Ideal	4.23	0.65		
Management and recruitment	Present	2.77	0.77	20.99	0.01
	Ideal	4.71	0.41		
Reengineering of the modules	Present	2.50	0.88	20.98	0.01
	Ideal	4.49	0.55		
Graduation	Present	2.66	0.74	22.34	0.01
	Ideal	4.45	0.52		

Modular Educational Framework

1. The philosophy and the objectives

- **Providing the ground for upgrading the quality of modular educational services in policy making, planning, implementing, evaluation, accreditation and reengineering.**
- **Substantiating the modular education in higher education**
- **Providing equal opportunity in modular education for all**
- **Clarifying all the dimensions of modular education**
- **Promoting capabilities among students, graduates, lecturers and authorities**
- **Removing recruitment difficulties**

2. Theoretical grounds

- **Theory of modularity of mind**
- **Competency Based Education Theory**
- **Mastery Learning Theory**
- **Action Learning Theory**
- **Sensory Simulation Theory**
- **Andragogy**
- **Facilitation Theory**

3. Dimensions and features of modularization

A. General considerations in designing modular education

- **Need analysis in modular curriculum design**
- **Flexibility in courses**
- **Self directed learning**
- **Student centered approach**
- **Job creativity approach**
- **Self employment approach**
- **Designing modules in consultation with content experts**
- **Designing modules in consultation with educationalists**
- **Designing modules in cooperating or consultation with employers, graduates and students**
- **Designing modules with the relevant content and adequate credits**
- **Allocating enough time for learning**
- **Considering individual differences**
- **Considering motivation and attractiveness of modules**
- **Considering the possibility of distance learning in designing modules**
- **Pilot study of the designed modules**

B. Components of modules

- **Relevance and introduction**
- **Directions or guidelines for use**
- **List of prerequisite skills and knowledge**
- **Objectives**
- **Complete contents**
- **Learning activities**
- **List of required sources and facilities**
- **Pre test**
- **Pre test answers**
- **Post test**
- **Post test answers**

C. Accreditation of modules

- Evaluation during designing modules
- Lecturers evaluation of the modules before implementation
- Quality control of the modules by a modular-specialized committee
- Piloting the modules in small groups of 3-5 students
- Piloting the modules in a few classes
- Evaluation of the effectiveness of the modules
- Feedback of the evaluation in redesigning the modules
- Evaluation of the appropriateness of the modular educational programs with social, economical and political situations
- Evaluation of the relevance of the modules with national developmental objectives
- Evaluation of the relevance of the modules with the needs of the following two decades

D. Student admission

- Priority for employees
- Relevance of the student's job with the intended course
- Admission of motivated students through entrance examination and interview

E. Implementation

- Developing team work teaching
- Flexibility in the selection of modules
- Student centered learning
- Teachers as facilitators
- Selecting teachers with capabilities in modular education
- Considering individual differences in implementing the modules
- Placement test at the beginning of the course
- Considering the student enrolment in the course or successful pass based on the placement test
- Progress feedback to the students during the course
- Short, quick and clear feedbacks to the students
- Clear guidelines in the feedbacks
- Helping the students to reach the objectives through the feedbacks
- Official final examinations
- Providing the students with official progress reports and advices
- A comprehensive final exam of all the modules

F. Management and recruitment

- Appointing managers familiar with modular education
- Appointing lecturers familiar with modular education
- Motivating lecturers to cooperate with modular education
- Facilitating faculty members promotions
- Improving recruitment
- Providing appropriate educational atmospheres
- Providing the appropriate facilities for implementing the modules for each field of study

G. Evaluation of modular instructional materials

- Ongoing evaluation of the needs for modules
- Revising the modules considering changes in the needs of the society and the feedbacks

- **Revising the modules if proved not effective**
 - **Revising the modules following the new guidelines and acts approved in the ministry**
 - **Omission, addition, or reorganization of the modules after revisions**
 - **Evaluating the cost effectiveness of modular programs**
- H Graduation**
- **Graduation based on standard theoretical exams**
 - **Graduation based on standard skill testing exams**
 - **Encouraging the students to continue education, get employment, be self-employed or create new jobs.**
 - **Establishing advisory teams on supporting the graduates to create jobs and be self employed**
 - **Facilitating continuing education at any time**
 - **Being in contact with the graduates**
- 4. Implementing the modular educational framework**
- **Launching modular information sites**
 - **Final approval of the Modular Education Frameworks in the ministry**
 - **Piloting the framework in the modular universities**
 - **Following necessary changes to make the framework more flexible and more practical with students' needs**
 - **Developing a regulatory framework**
 - **Implementing the framework in all modular universities**
 - **Establishment of a curriculum development committee working under the supervision of vice chancellor for education**
 - **Establishment of accreditation committee of modular education**
 - **Conducting educational workshops in designing, teaching and evaluation of modules for the faculty**
 - **Developing modular educational packages for distance learning, vocational studies and all engaged in modular education.**
- 5. Accreditation and reengineering**
- **Ongoing evaluation of the implementation of the framework and providing feedback in modular information sites**
 - **Reevaluating the feedbacks**
 - **Final accreditation**
 - **Interpretation and analysis of evaluations and providing final feedbacks**
 - **Reengineering and general revision of the framework during the five year national developmental programs.**

teaching clinical sciences. Nearly all the participants, 12 out of 14, agreed that the framework is applicable in clinical education.

Discussion

The purpose of the study was to evaluate the present situation of modular education and to develop a MEF for Iranian higher education and

to examine the applicability of the framework in clinical education. According to the results of the study, the present situation of the modular system is not in accordance with the theoretical underpinning of modular education. In interviews and field observations, it was revealed that much education was conducted in normal theoretical classes with little or no concern regarding individual differences among students, flexibility

of courses and nearly all the scales and subscales in the framework. The only scale which was considered to be moderate was student admission, in that, the students can enroll in courses without entrance examinations. According to the results of the study, the ideal situation was significantly different from the present situation suggesting that the Iranian modular education should follow an extensive revision in all aspects of the proposed MEF.

According to the results of the analysis of the consultation with medical experts, 12 out of 14 experts believed that the MEF was applicable in clinical education. Considering clinical education which is more skill based, the applicability of MEF in clinical education seems plausible. An interesting finding was that half of the participants believed that clinical education is conducting very closely to modular education. They argued that clinical education in hospitals is organized similar to modules and students should finish each ward, ophthalmology, pediatrics, gynecology, etc similar to enrolling a module. However, a lot needs to be done to narrow the gap in modular education and clinical education. We would recommend piloting the proposed modular framework in clinical education. This may pave the path to adapting the modular education in clinical education.

Acknowledgements

We would like to thank Dr Ghoorcheyan for his useful advices.

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