Pediatric Course Evaluation Based on SPICES Model: A step toward student centered curriculum

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ABSTRACT

Objective: The quality of health care services available to the public depend on the education and training of health professional students. In our study we show the need to induce paradigm shift in undergraduate medical curriculum to ensure graduating reflective competent doctors. We use Harden Spice model as an example of new integrated curriculum. We focus on one of its essential education strategy that is student-centered against teacher-centered in the traditional curriculum the Aim is to compare between the new SPICES model of instruction and the traditional one.

Methods: in pediatric clinical session for Sixth year medical students, there were 16 medical students (14 females and 2 males) during the traditional session (teacher-centered), all the information were delivered to them were completely true except one subject, which was intended to be a very important and completely wrong to be the point by which we test the old instructional design.

Results: Our pilot study show that in teacher-centered instructional design, the possibility of graduating doctors with wrong information is high. Wrong information received uncritically by the students may be passed over during exam and the result is that the students pass the exam successfully even though they had wrong information.

Conclusion: Adopting Curriculum reform is mandatory to ensure graduating competent, reflective doctors who can practice medicine in professional way. It is not just for the sake of quality assurance and accreditation agency pressure but it is our social and academic accountability toward our community and its health.

INTRODUCTION

There are increasing calls for change and improvement in medical education since 1900. Abraham Flexner, in his famous 1910 report, proposed the present curriculum in which basic sciences are separated from clinical science and led by independent department medical education that prevailed during the first half of the 20th century 1. This shift from apprenticeship to discipline based curriculum was very important step in medical education reform which helped in making medical schools more trusted and accepted by the public. But with time new problems started to appear, one of these problems is the gap felt by student between practicing medicine at bedside and learning medicine at school 2. This create dissatisfaction among medical students and become less engaged and motivated, most of them feel burnout. Responding to these problems, many medical schools have revised their curricula and tried to overcome the known concern of dissociation of Basic Science and Clinical practice by developing horizontally and vertically integrated curricula 3, 4.
Education should be aimed at preparing students to deal with problems in the future, training them to become self-directed, lifelong learners and problem solvers, rather than passive recipients of information. Traditional curriculum is not consistent with current philosophical views of human learning particularly adult learning principles and constructivism.

Being in the age of information technology and knowledge exposition and mobile learning, reform and paradigm shift become urgent to keep pace with pressing demand of this digital era. Students at this time need to learn how to learn more than what to learn, to ensure adopting critical thinking and evidence based practice. They need also another generic skills like teamwork, leadership, social and emotional intelligence which are absent or hidden in the traditional curriculum. These new educational outcomes make the need to redesign the curriculum in away ensuring achievement theses outcomes.

These changes induced the most important paradigm shift in medical education which is the outcome based education in which educational program designed according to theses outcomes that are determined and shared between educational policy makers, experts in the academic fields, stakeholders, patient and students. Outcome-competency-based education offers a powerful and appealing way of reforming and managing medical education, much of the focus in medical education has moved from the ‘how’ and ‘when’ to the ‘what’ and ‘whether’. Identifying, defining and communicating the skills and qualities we want doctors to have is fundamentally important. It is a process we must go through if we are to be clear about the tasks to be performed by the doctor in the inner core, the approaches to the performance of the tasks in the middle area, and the growth of the individual and his or her role in the practice of medicine in the outer area.

A three-circle model can be used to present the learning outcomes in medical education, with the tasks to be performed by the doctor in the inner core, the approaches to the performance of the tasks in the middle area, and the growth of the individual and his or her role in the practice of medicine in the outer area.

Another great paradigm shift in higher education is the learning Paradigm, which replaced the teaching paradigm in which teacher don’t listen and student don’t talk. This new Paradigm become the ground on which student - centered curriculum developed. This new Paradigm is in accordance with the philosophy of constructivism and adult learning theories. The first step in leading any change is to change our beliefs and assumptions, if we want to see things in new look.

**Back to the things themselves**

This is what Malcolm Knowles (1988) did, when he adopt a phenomenological attitude whether he knew or not, by going back from our belief about learners to the learners themselves. He considered that adults learn in different ways from children. He introduced the term “andragogy” to differentiate adult learning from pedagogy; this differentiation now seems to be artificial. Many of the principles of andragogy can be applied equally to children’s learning.

Knowles was that adult learners differ from child learners in six respects:

1. The need to know (Why do I need to know this?).
2. The learners’ self-concept (I am responsible for my own decisions).
3. The role of the learners’ experiences (I have experiences which I value, and you should respect).
4. Readiness to learn (I need to learn because my circumstances are changing).
5. Orientation to learning (Learning will help me deal with the situation in which I find myself).
6. Motivation (I learn because I want to).

Responding to the call of change/reform of medical educational practice cannot be achieved unless we change our belief system (paradigm), as Helen Maupin said: I shifted my belief from “I’ll believe it when I see it” to “I’ll see it when I believe it”.

This give the justification to focus on the meaning of Paradigm and paradigm shift and how it can transform our practice.
Kuhn and Paradigm shift
Thomas Kuhn in 1962 in his seminal work The structure of scientific, argued that change in a scientific field does not occur as a step-by-step, cumulative process, instead, new paradigms emerge as the result of tradition-shattering revolutions in the thinking of a particular professional community. These shifts involve the adoption of a new outlook on the part of researchers and others in that community. Well-known examples of paradigm shifts in the physical sciences include from Ptolemaic to Copernican astronomy and from Newtonian to quantum physics.

Ausubel understood Paradigm as another word for pattern. Pattern forming is part of the way we attempt to make meaning from our experiences. We use these patterns to understand situations, raise questions, build links and generate predictions. When a paradigm shift takes place, we see things from a different perspective. Twentieth century paradigm shifts across a wide variety of fields can be seen as part of a larger shift from positivism to post-positivism. Awareness of this broader shift helps make clearer the shifts that take place in any one particular field. Table 1 provides a brief look at some contrasts between positivism and post-positivism.

Mezirow and Paradigm shift
Mezirow showed that Paradigm shift is an outcome of transformative learning experience as he said that “learning is understood as the process of using a prior interpretation to construe a new or revised interpretation of the meaning of one’s experience in order to guide future action.”

Transformative learning offers an explanation for change in meaning structures that evolves in two domains of learning based on the epistemology of Habermas’ communicative theory. Transformative learning attempts to explain how our expectations, framed within cultural assumptions and presuppositions, directly influence the meaning we derive from our experiences. It is the revision of meaning structures from experiences that is addressed by the theory of perspective transformation. Taylor (1998) believed that too much emphasis was placed on the teacher at the expense of the student. He emphasized that learners share the responsibility for constructing and creating both the environment and the process of transformational learning.

Mezirow described this transformation of perspective as going through ten ordered phases:
- Experiencing a disorienting dilemma.
- Undergoing self-examination.
- Conducting a critical assessment of internalized assumptions and feeling a sense of alienation from traditional social expectations.
- Relating discontent to the similar experiences of others—recognizing that the problem is shared.
- Exploring options for new ways of acting.
- Building competence and self-confidence in new roles.
- Planning a course of action.
- Acquiring the knowledge and skills for implementing a new course of action.
- Trying out new roles and assessing them.
- Reintegrating into society with the other perspective.

Argyris and Schön and Paradigm shift
Argyris and Schön’s book, Theories in Practice (1974), explored how effective and ineffective learning takes place within individuals and groups. Their work has led to more self-awareness and reflective practice which is an essential skill to be human. According to Argyris and Schön, theories are “vehicles for explanation, prediction, or control” and all humans, whether they are conscious of it or not, operate according to thousands of theories to explain their experience, predict future events, and control outcomes in various situations.

Argyris and Schön’s argument that people have mental maps with regard to how to act in situations. This involves the way they plan, implement and review their actions. Furthermore, they assert that it is these maps that guide people’s actions rather than the theories they explicitly espouse. What is more, fewer people are aware of the maps or theories they do use. One way of

Table 1. Contrasts between positivism and post-positivism

<table>
<thead>
<tr>
<th>Positivism</th>
<th>Post-Positivism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emphasis on parts and decontextualization</td>
<td>Emphasis on whole and contextualization</td>
</tr>
<tr>
<td>Emphasis on separation</td>
<td>Emphasis on integration</td>
</tr>
<tr>
<td>Emphasis on the general</td>
<td>Emphasis on the specific</td>
</tr>
<tr>
<td>Consideration only of objective and the quantifiable</td>
<td>Consideration also of subjective and the non-quantifiable</td>
</tr>
<tr>
<td>Reliance on experts and outsider knowledge--researcher as external</td>
<td>Consideration also of the “average” participant and insider knowledge--researcher as internal</td>
</tr>
<tr>
<td>Focus on control</td>
<td>Focus on understanding</td>
</tr>
<tr>
<td>Top-down</td>
<td>Bottom-up</td>
</tr>
<tr>
<td>Attempt to standardize</td>
<td>Appreciation of diversity</td>
</tr>
<tr>
<td>Focus on the product</td>
<td>Focus on the process as well</td>
</tr>
</tbody>
</table>
making sense of this is to say that there is split between theory and action. However, Argyris and Schön suggest that two theories of action are involved. The distinction made between the two contrasting theories of action is between those theories that are implicit in what we do as practitioners and managers, and those on which we call to speak of our actions to others. The former can be described as theories-in-use. (Embodied theory), while the other is the espoused theory (disembodied).

Chris Argyris and Donald Schön suggest that each member of an organization constructs his or her own representation or image of the theory-in-use of the whole (1978: 16). The picture is always incomplete – and people, thus, are continually working to add pieces and to get a view of the whole.

The first step is to know the theory in use, the curriculum in use, which control and predict our curriculum design and teaching and assessment strategy. Paradigm shift is needed to change the type of learning in any organization, in the language of Argyris and Schon, we need a double loop learning in which our theory in use is transformed as explained. This model describes two ways through which we learn from our experiences that are: single-loop and double-loop learning.

Double-loop learning is different than single-loop learning which involves changing methods and improving efficiency to obtain established objectives (i.e., “doing things right”). Double-loop learning concerns changing the objectives themselves (i.e., “doing the right things”).

Single-loop and double-loop learning are readily understood using the analogy of a household thermostat. Single-loop learning is about achieving a given temperature—like a thermostat set to 68 degree that turns up the heat whenever the temperature drops below 68 (the objective). Double-loop learning involves changing the setting on the thermostat (i.e., changing the objective of the system).

Our study induced double loop, a paradigm shift in ourselves and our students this experience can be expressed fully in a later phenomenological qualitative research. In this study we tried to show quantitatively the difference between the two models of curriculum (teacher centered vs student centered). Six major issues have been identified as educational strategies for curriculum planning, these have been referred to as the SPICES model.

The point we want to concentrate on it is student-centered against teacher-centered in the traditional curriculum. Student-centered emphasizes on what the student learn, while teacher-centered is depend on what is taught.

Since its foundation at 1993 and till the time of this study, our collage of medicine apply traditional curriculum. Now we hear about curriculum changing that had been adopted both internationally and nationally in other medical collages. Changing is not a simple matter, not only because of its specific demanded resources, but I think in any changing process the most difficult step is to change the mind of the people who involved in this change. According to that, if we want to induce a paradigm shift from the traditional curriculum to new outcome\student centered curriculum, first of all we should know our embodied theory and its consequences on educational outcomes and student learning and motivation, and this is what our pilot study tried to document.

Table 2. Comparison between SPICES model and traditional one

<table>
<thead>
<tr>
<th>SPICES model</th>
<th>Traditional model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student-centered</td>
<td>Teacher-centered</td>
</tr>
<tr>
<td>Problem solving</td>
<td>Information gathering</td>
</tr>
<tr>
<td>Integrated</td>
<td>Specialty</td>
</tr>
<tr>
<td>Community-based</td>
<td>Hospital-based</td>
</tr>
<tr>
<td>Elective</td>
<td>Standard</td>
</tr>
<tr>
<td>Systematic</td>
<td>Apprenticeship</td>
</tr>
</tbody>
</table>

Since its foundation at 1993 and till the time of this study, our collage of medicine apply traditional curriculum. Now we hear about curriculum changing that had been adopted both internationally and nationally in other medical collages. Changing is not a simple matter, not only because of its specific demanded resources, but I think in any changing process the most difficult step is to change the mind of the people who involved in this change. According to that, if we want to induce a paradigm shift from the traditional curriculum to new outcome\student centered curriculum, first of all we should know our embodied theory and its consequences on educational outcomes and student learning and motivation, and this is what our pilot study tried to document.
MATERIALS AND METHODS

In one of my 6th year stage clinical session in January 2015, there were 16 medical students (14 females and 2 males) who was originally present in the group (not selected by me). During the session (teacher-centered), all the information given by me regarding a specific and important subject were completely true except one, which was intended to be a very important and completely wrong to be the point by which I test the curriculum. Discussion and questioning is the used teaching method. At the end of about 1.5 hour session, students were asked that if there is any inquiry about anything related to our subject and their demands were matched.

In the second day I collect the same students and mention the same wrong information and ask them to answer in paper that "is this information true or false according to your readings?" and also to write in the paper the source that they depend on in their answers. Then examination papers were collected.

All previous work had been done blindly, then I told the students that this information is completely wrong and encourage them not to be passive learners.

The 16 papers were divided into 2 groups; group 1 whose answers were wrong, and group 2 who had true answers. In each paper I look for the source of information, those whose information is dependent only on my previous session assigned as A, while those who had other sources such as internet, books, etc. were assigned as B.

Also we look for the scores that these students achieved at the exam done at the end of the pediatrics course by the pediatrics department/college of medicine/Babylon University, and according to their scores they categorized either as pass the exam successfully or fail to pass it, regardless the precise score (high or low).

RESULTS

From 16 students, only 4 (25%) have right answers while the rest 12 (75%) have wrong one.

Table 3. The number and percentages of students with wrong and write answers

<table>
<thead>
<tr>
<th>Group</th>
<th>Total</th>
<th>Group 1</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td>16</td>
<td>12</td>
<td>75</td>
<td>4</td>
</tr>
</tbody>
</table>

Majority of students 12 (75%) depend solely on the previous session, and only 4 (25%) have other sources as internet, books, etc.

Table 4. Illustrate the source of the information

<table>
<thead>
<tr>
<th>Group</th>
<th>Total</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td>16</td>
<td>12</td>
<td>75</td>
<td>4</td>
</tr>
</tbody>
</table>

All students who answer falsely (12) depend only on the previous session in their answers, while all with perfect answers (4) had other sources. This illustrated in the figure 5.

Table 5. The relation between the answers and the source on which the answers depend is showed in table 4

<table>
<thead>
<tr>
<th>Group</th>
<th>Total</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td>1</td>
<td>12</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

Fig. 5 The relation between the student’s answers and their success in the end course exam

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Both group 1 and 2 pass the exam successfully with no failure case.

Table 6. Explain the relation between the student’s answers and their success in the end course exam

<table>
<thead>
<tr>
<th>Group</th>
<th>Total</th>
<th>Pass exam successfully</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

DISCUSSION
In the narrowest concept of curriculum, it includes only content and assessment in the form of an examination. One of the goals of assessment is to protect the public by identifying incompetent physician.

So legally if a medical student has a perfect information and pass the exam successfully, he will be publically beneficial. While if he possessed imperfect information, he should not pass the exam and so the goal of not introducing incompetent physician will be achieved. On the other hand, if he had imperfect information and pass the exam successfully, the community will receive incompetent physician (harmful physician).

What happen in our occasion is that only 4 (25%) students achieve the goal of assessment, while we provide the community by 12 (75%) incompetent physician as they pass the end course exam successfully while they have wrong information (table 3 and 6). This has been illustrated in figure 6.

RECOMMENDATION
Applying integrated, student-centered curriculum from the first year of medical study, but if not possible to lead such a radical change we can introduce student centered approach through small group teaching and team based learning.

REFERENCES


