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ORIGINAL RESEARCH

WHAT CHANGES IN IMPLEMENTING COMPETENCE-BASED MEDICAL EDUCATION IN INDONESIA: A QUALITATIVE STUDY

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ABSTRACT

Background: Competence-based Medical Education (CBME) is the latest curriculum model adopted by many countries since 1970s. Reforming medical curriculum to adopt CBME implicates major changes in all aspects and research on this is still lacking. This study aims at identifying changes in implementing CBME from the aspects of organization and structural changes, curricular design, implementation and evaluation and cultural changes.

Methods: Retrospective qualitative method is applied using purposive sampling. Selected documents are used as the data and analysed using thematic analysis.

Results: Four themes are identified for the first aspect, i.e. the role of central authority, multidepartment committees, committed change agents, and decision-making procedures. Whereas for the second aspect, five themes are pinpointed, consisting of curriculum design at macro level, meso and micro level, faculty development program, learning resources, implementation, and monitoring and qualitative evaluation. For the third aspect, four themes emerge, namely enabling factor, inhibiting factor, the paradox of the new curriculum and quality assurance.

Conclusion: Major changes taking place in the design and implementation of CBME have been identified from three aspects inductively. Awareness of the kinds of changes and using them for curriculum planning could improve the success in shifting towards CBME.

Keywords: competence-based medical education, medical curriculum

PRACTICE POINTS

- Implementing CBME implicates changes in aspects of organization and structure, curricular design, implementation and evaluation, as well as cultural changes. Detailed empirical changes of each aspect are identified in this study.
- Understanding and awareness of the kinds of changes in those three aspects are important for medical schools embarking on CBME
- The kinds of changes could also be used by universities or government for planning purposes

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INTRODUCTION

Competence-based medical education (CBME) have been widely adopted in many countries. For the last five decades, CBME has been at the top of discussions in many conferences. As early as 1978, the WHO published a Competency-based Curriculum Development in Medical Education.[1] This is sparked by the competency-based movement in higher education in the 1960s where the premise is that explicit minimal competency-based education would promote educational accountability[2] as stakeholders concerned have the same level of expectations of the graduates' ability. Medical educators across major developed countries, namely United States, United Kingdom and Canada have been endorsing the adoption of competence-based medical education.[3]

A growing number of key publications significantly increased.[4] Report on the implementation of CBME also mounted at the pilot level as well as at the full scale level across the whole curriculum.[5] There have been efforts to clarify the definition, constructs and characteristics of competencies and CBME.[6] Albanese et al argued that clear definitions of competencies are needed, because competency framework is now used for certification and maintenance of certification. They proposed the following definition: '*competencies are knowledge, skills, attitudes and personal qualities essential to the practice of medicine*'. They also formulate characteristics of competencies, such as '*focus on the performance at the end of a particular stage, mastery of competencies is reflected in the application in the context of patient care, use of performance standard that is criterion-referenced*'.[7] Tuning Educational Structures in Europe defines competences as '*a dynamic combination of knowledge, understanding, skills and abilities.*' Competences are obtained or developed during the process of learning. A distinction can be made between generic competences (i.e. transferable competences across study areas) and subject-specific competences (i.e. competences specific to a subject area).[8]

Epstein and Hundert propose the definition of professional competence as '*the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values and reflection in daily practices for the benefit of the individual and community being served*'.[9] Physicians' competencies are multidimensional, dynamic, contextual and developmental. It comprises of multiple domains of abilities. For each domain of competence, there is a corresponding spectrum of ability from novice to master, contextual and ever-changing. Physician has a unique constellation of abilities at any time and in any context.[6] Competency development requires specific conditions and contexts. Learners need to observe models and exemplars that illustrate processes and outcomes to be learnt. They need to be given opportunities to perform focused practice and rehearse specific skills, whilst receiving immediate and informative feedback in a defined setting. They should be encouraged to perform these skills in diverse settings. They also must reflect on their performance.[10] Central to the development of competency is the process of longitudinal direct observation with scaffolding. Teachers provide successive levels of support that enable learners to attain successively higher levels of comprehension and skill acquisition during this time.

Despite the variety of definitions and understanding of competencies, in medical and health professional education, competencies frameworks have been used as the reference for curriculum design and planning at the school level. A number of countries have published their competencies framework, such as Standards of Indonesian Medical Doctors' Competencies,[11,12] Outcomes for Graduates,[12] CanMEDS 2015 Physician Competency Framework,[6] and ACGME six core competences in the US.[13] All these competencies framework comprises of several domain or area of competencies, such as communication skill, system-based practices, professionalism, etc. Each domain of competency is broken down into a number of competency components. Each competency component is further detailed into more specific learning outcomes. The identification of domain of competencies and their correlated competency components takes into account the role and functions of physicians in the health care system.

However, there are critics regarding the concepts of competency model being applied for medical profession, be at undergraduate or postgraduate

level. Talbot argues that competency model might not be most appropriate for educating medical professions. Such competency models are constructs taken from the industry in the USA and adopted in UK for vocational trainings, later on by many countries. This model is grounded in the behavioral and cognitive paradigms. In this model, tasks are broken down into smaller units and the assessee is graded according to the successful completion of each unit of competency.[14] This way of looking at tasks is too simplistic and reductionism. Squires develops a medical practice which shows the complexity of the medicine.[15] Medical practitioners need to move beyond competencies. Malone and Supri argues that competence is complex and cannot be reduced into isolated elements, competence-based approaches are not appropriate for highly skilled profession such as medicine. They explain that competence-based education is more applicable for lower level occupations that involve routine tasks and simple testable skills.[3]

Notwithstanding all the controversies surrounding the competence-based education, this educational approach is still the most popular. Evidences of forty years' application of competence-based curricula across the globe reveal that this educational approach is philosophically questionable, methodologically complex and highly controversial.[3]

Major curriculum reforms have been attempted for the undergraduate and postgraduate medical education based on the competency's framework. An example is in Canada. The Royal College of Physicians and Surgeons of Canada has embarked on a major shift in medical education. Competency-based medical education is perceived as an integrated, longitudinal, trainee-focused approach "*to preparing physicians for practice that is fundamentally oriented to graduate outcome abilities and organized around competencies derived from an analysis of societal and patient needs. It deemphasizes time-based training and promises greater accountability, flexibility, and learner centeredness.*"[8]

Nousiainen at al highlighted three key aspects of implementation that will be encountered when a medical school decides to implement CBME, namely organizing the structural changes that will

be necessary to deliver new curricula and methods of assessment; modifying the processes of teaching and evaluation; and helping to change the culture of education so that the CBME paradigm gains acceptance. Nine considerations are identified as supportive for changes for the two key aspects.[16] For the third key aspect, Ferguson et al identified cultural barriers to adopt CBME existed in the culture of medical education institutions. Therefore, change in educational culture must be embraced by all components of the medical education hierarchy. Research is essential to provide convincing evidence of the benefit of CBME.[17]

Four overarching challenges have to be considered when embarking on the adoption of CBME at all levels, namely: "(1) *aligning regulatory stakeholders to support competency based education and training*; (2) *integrating educational and clinical redesign efforts to align curricular objectives with experiential training*; (3) *establishing defined outcomes that reflect the needs of patients and populations in which individuals, programs, and institutions can be measured*; (4) *ensuring accountability among all stakeholders for the achievement of defined outcomes*".[18] However, it is debatable whether a competence-based approach to the medical curriculum will fulfil these intended aims.[3]

In Indonesia, the Medical Practice Law No.29/2004 adopted the competence-based approach in the medical profession education. This Law mandated the Indonesian Medical Council to issue Standards of Medical Doctors' Competencies in 2006, which comprises of seven areas of competencies as follows: (1) effective communication, (2) clinical skills, (3) scientific basis of medical knowledge, (4) management of health problems, (5) management of information, (6) self-awareness and self-development, (7) ethics, morals, medico-legal, professionalism, and patient safety.[19] The Indonesian Medical Council also passed the Standards of Medical Profession Education as a guidance for medical schools on how to develop CBME.

Since then, between 2006 until 2011 Indonesia experienced nationwide medical curricular reforms. Each medical school gradually strived to adopt CBME based on the Standards of Medical Doctors' Competencies. However, there were variations in

the process of changes from subject-based to CBME among sixty medical schools with diverse conditions, likewise the implementation of CBME itself. Each medical school has an autonomy to develop their own curriculum, resulting in the varied models of CBME. The aim of this study is to investigate what changes have occurred in implementing CBME – both from the organizational and curricular aspects.

METHODS

Context

This study was conducted at Faculty of Medicine Universitas Gadjah Mada (FMUGM), because it was the first to implement CBME in Indonesia at full scale starting in the Academic Year 2007/2008. Taking into account the complexities of changes and to ensure that the reform process was smooth and on the right direction, FMUGM invited Maastricht and Groningen Medical Schools to coach during the preparation, implementation and evaluation of CBME from 2006-2014. A two million Euro grant from the Netherland Government under the Netherland Post-Secondary Training (NPT) Scheme was obtained to fund this competence-based curricular reform.

Study design

Qualitative paradigm is used in this retrospective study with the main focus to understand the organizational and curricular changes in implementing CBME. Qualitative researchers study phenomenon in their natural settings, attempting to make sense or interpret the phenomena in terms of the meanings people bring to them.[20] The phenomenon being studied here is changes in the implementation of CBME.

Sources of evidences

The main evidence used in this study is documents because they can provide a means of tracking change and development. Documents can be used as stand-alone method.[21] Documents are secondary data that are situational and exists independent of the study, and are not created for the purpose of the study. Secondary data provides objective buffer between the researcher and the researched. However, some cautions need to be taken into consideration, such as articulating the research questions clearly and selecting documents that could address these questions. The documents were screened for authenticity and credibility. After the documents were carefully selected, the data were examined and interpreted in order to elicit meaning, gain understanding and develop empirical knowledge.[22] As documents are secondary data, ethical clearance is not needed.

Data collection and analysis

Documents related to the design, preparation, implementation and monitoring of CBME implementation during the NPT Project at FMUGM were selected, comprising of: (i) project proposal, (ii) inception report, (iii) 6 project management reports, (iv) 8 management visits reports, (v) 2 monitoring report by external consultants, (vi) annual reports from 2007-2011, (vii) final report 2012 (viii) one external evaluation report from renown international consultants. The selection of documents was guided by the aims of the study, i.e. understanding the changes in implementing CBME, from the organizational and curricular aspects.[16]

Thematic analysis is applied in this research as it is most appropriate for systematically identifying, organizing and developing insights into patterns of meaning (themes) across the data set. This offers researchers to make sense of collective meaning.[23] The purpose of thematic analysis is to identify relevant themes to answer particular research issues.

All documents were given symbols and read thoroughly. Paragraphs that were relevant to the research questions from each document were copied and pasted into a table. After all the excerpts from each document were collected in the table, the principal researcher read several times and colour coded the paragraphs or sentences that bore underlying meaning. Initial coding was first created for the colour coded paragraphs by the principal researcher. After several iterations, the initial coding was refined to provide answers or meaning

to the research issues. The second author did the second coding from the excerpts independently. The principal researcher identified themes from the second coding. Final themes and subthemes were created after each emergent theme was validated. The final themes were grouped according to three key aspects of changes in CBME implementation. The third author reviewed the final manuscript.

A total of 212 pages from the selected documents were analysed. Seventy-two initial coding were constructed and 13 themes were identified as depicted in Table 1. They are group into organizational and structural changes that relates to the organizational structure, management and governance needed to deliver the curriculum; curricular process pertaining to the design, implementation and evaluation of the curriculum; and cultural changes.

RESULT AND DISCUSSION

Tabel 1. Themes

No	Themes Grouped in Three Key Aspects of CBME Implementation
	1. Organizational and Structural Changes
1	The role of central authority
2	Multidepartment committees
3	Committed change agents
4	Decision making procedures
	2. Curricular Design, Implementation and Evaluation.
5	Curriculum Design (at macro, meso and micro level)
6	Faculty Development Program
7	Learning resources
8	Implementation
9	Monitoring and Qualitative Evaluation
	3. Cultural Change
10	Enabling Factor
11	Inhibiting Factor
12	The paradox of a new curriculum
13	Quality assurance

1. Organizational and Structural Changes
The role of central authority

CMBE requires a strong role of central authority to coordinate all departments and units involved in running the curriculum, because the design of CBME involves integration of content across the learning domains.[24] In the following excerpt, it is stressed that making reasoned choices of contents cannot be left to individual departments, but needs a strong central leadership.

"*We therefore recommend that the staff of UGM medical school once again reviews the subjects taught and make reasoned choices on what to keep, what to discard, and what to introduce. It is clear that such discussion cannot be left to the individual departments but should involve the faculty as a whole. The leadership should play a guiding role in this. The decision of the government to change the national core curriculum from a subject-based to a competency-based curriculum may provide a good opportunity to do just that.*" (EE06 page 3)

Not only in the academic phase, in CBME the role of the deanery extends to the clinical phase. The central authority at the faculty level should provide a curriculum map and guidance with regards to having adequate clinical training. This is in line with the finding from Harris et all describing that longitudinal rotations to permit greater continuity between physicians and patients, faculty and trainees, and trainees and other members of the health care team is needed. This could enhance the effective professional development as well as improve the support coaching and feedback.[18] This notion is depicted in the following excerpt.

"Ideally, the dean should be responsible for the design of the clerkship program, whereas the heads of the departments should be responsible for the execution of the programs and the quality of the clerkships at their department. What is felt urgently required is the development of standards by the medical education department listing the basic requirements for adequate clinical training." (MM07 page lines 1-12)

Multidepartment committees

One implication of having a central coordination in CBME is to establish multidepartment committees/units/teams. This obviously implicate a change in the organization structure. When embarking on preparing the CBME, it was soon realized that the first thing needed to be changed was the organization structure. This has been highlighted by Nousiainen et al.[16] A number of **multidepartment committees** were established, as described in the following excerpts.

"List of committees/units/teams that have been established during the NPT Project: block team, year coordination team, clinical planning rotation team, clinical rotation team, liaison officer team, skills lab planning team, assessment committee, curriculum committee....etc." (AR10 Annex 3)

"Two main committees were installed, namely Curriculum Committee and Assessment Committee. The main task of Curriculum Committee is to ensure that the block books are developed in accordance with
the macro and meso curriculum. The main task of Assessment Committee is to formulate assessment regulations and to safeguards that these regulations are complied. In addition to this, the Assessment Committee also safeguards that the procedures for quality assurance in assessment are carried out, such as items reviews, etc." (FR12 page 12 lines 26-36)

Committed change agents

To run this innovation project, a group of committed academic staffs as **change agents** - who were willing to work hard, receptive to the ideas of CBME and ready to execute the strategic plans was needed. A new Department of Medical Education was established. Through this department, ten young and enthusiastic academic staffs were recruited and sent to Maastricht Medical School for completing Masters in Health Profession Education. Senior academic staffs were also recruited as from basic and clinical science departments. The following excerpt describes this.

"The Head of this Department - was appointed as the NPT Project Manager from the UGM Side. UGM-FM was lucky to have a strong founder of the new Department of Medical Education to make the necessary preparations. At the start there was only one full time staff available. A young and enthusiastic team of professionals was appointed (core team)" (FR12, page 11, lines 29-33).

Decision making procedures

As for the members of Faculty Senate and Faculty Board, a series of leadership workshops run by experts from Maastricht and Groningen medical schools were conducted to introduce the tenets of CBME and make them committed to adopt this education approach. To avoid the confusion of who is doing what as the whole institution was in the process of changes, the ISO management system was installed and hundreds of standards operating procedures (SOP) were developed through a series of workshops. This is to ensure decision making procedures were complied. The following excerpt explains the leadership workshop.

"Tuesday: workshop on translation of strategic planning and academic policies (prepared in November 2010) at the faculty and departmental level, the selection of key performance indicators, the relationship between faculty and departmental level for the accountability system, performance appraisal. Participants: heads and secretary of departments and faculty board" (MOM10, lines 27-31)

This endeavor confirms Ferguson et al to align regulatory stakeholders to support CBME and to ensure the accountability among all stakeholders for the achievement of defined outcomes.[18] In this case, it is the internal stakeholders that were intervened through internal regulation, such as academic policies.

At the block level, the decision-making process in the selection of content is done through consensus building, such as nominal group technique to avoid gaps and overlaps of content across the blocks. The decision-making process at the block level needs an authorization from the higher level, such as faculty senate. This is explained in the following excerpt.

"Reduction of subjects to be discussed in the block periods to a number that fits within the framework of the block periods. Curriculum- and year co-ordinators should play a central role in this process to reach a balanced core curriculum and to avoid on wanted gaps and overlap. It is suggested to use a Nominal Group Technique (NGT) or comparable approach for this purpose. Procedure should be completed for all block periods before mission mentioned in 3" (PP08, page 1, paragraph 1.1.3)

"So, this means that choices should be made. Which subjects of year 2 can be transferred to 'emergency' in year 4 or to clerkships? Year 2 is about transition between theory and practice having life cycle and acute disorders as main themes. So, restriction to prevalent (acute) problems is the principle part for year 2. Keep the pathology simple. Decisions have to be made in good harmony between coordinators of rotations and block teams with authorization of faculty senate and curriculum team" (RP2, page 2 paragraph 5-10).

2. Curricular Design, Implementation and Evaluation

Curriculum design at macro, meso and micro level

Harris et al highlight that CBME involve curriculum design accommodate a various number of activities, each of which should contribute to the achievement of explicit, agreed outcomes. Once these outcomes are clearly set forth, curricular components are designed to foster the acquisition of "enabling skills" and of knowledge. This should be structured in a logical sequence.[25] In a CBME system, curricula and assessments are driven by predefined outcomes or competencies. Learners are expected to demonstrate achievement of these outcomes before moving to the next stage of training. CBME does not mandate any particular teaching strategy or philosophy, and many methods (e.g., problem-based learning, case-based teaching) may continue within the CBME approach.

Parallel to the reorganization and structural changes, the curriculum design was conducted. The issuance of the Standards of Medical Doctors Competence by the Indonesian Medical Council in 2006 came at the right time of the beginning of the project. It was soon agreed at the inception phase that competence-based medical education would be adopted. FMUGM already implemented the problem-based learning in 1992 partially, and gradually in 2002 it reached the full scale. When the agreement to adopt CBME was taken, the narrative that was used was the process was still the same – i.e. problem-based learning as the backbone, but we only changed the outcome of the medical graduates to comply with the Standards. Due to this, a number of adjustments in curriculum structure and contents, with the emphasis on clinical education, as well as in assessment system needed to be done. In line with Harris et al as explained above, CBME is flexible enough to accommodate any existing learning strategy. This is explained in the following excerpt.

"The second assessor was briefly involved in the introduction of problem-based learning by the Fakultas Kedokteran in 1992. This effort led to the establishment of the so-called "hybrid" curriculum that lasted for 10 years. Compared with 14 years ago, he notices a remarkable change of atmosphere. Then, the

majority of the staff was hesitant, skeptical whether the new approach to medical education would work in Indonesia, and concerned whether there was time and money to make the giant leap that seemed necessary to establish such new curriculum" (EE06 page 1)

Designing curriculum at macro level was executed by the curriculum committee who worked closely with the experts from Maastricht and Groningen medical schools. A number of workshops to develop a curriculum map for the whole years from academic to clinical phase and also study visit to Netherlands were conducted. In those workshops that were attended by representatives from all departments (24 departments), the philosophy of CBME and how to translate the Standards of Competences into curriculum map were discussed. It was quite a rigorous and iterative process when the participants distributed hundreds of competency components and learning outcomes, including seven hundred diseases, two hundred clinical skills, hundreds of problems - based on sign and symptoms into each block to make up a blueprint block or meso level. Each blue print attempted to balance between national standards and local contents. To achieve a full integration of curriculum – both horizontal and vertical integration as well as longitudinal lines, a new curriculum map was agreed. The above process is explained in the following excerpts.

"...the Core Team of Curriculum 2007 also managed to discuss the draft curriculum map which was composed in December 2005 together with MvS. The Team revised the Curriculum Map and also decided the draft outcome of each Block" (IR06 page 7 paragraph 20-23).

"that every block team seriously should give attention to the possible overload of specific objectives in their block. In our opinion most blocks want to cover too many diseases by long lists of objectives. In Maastricht we did the same in one of the forgoing curricula..." (RP2 page 1 paragraph 26-29)

"...in block 2.2 students have to 'perform the management of hyperemesis gravidarum: parenteral fluid and psychological support' (2.2B1.2.IV) and

to 'perform first aid in high risk pregnancy and obstetric emergency' (2.2.B.4). We would suggest that these complications could better be dealt with in the emergency block or during the gyn/obs rotation" (RP2 page 1 paragraph 33-40)

"During the discussion it was frequently stressed that skills should be taught 'just in time' when it is relevant to the content of the block conducted at a certain time. Some suggestions were made as to the composition of the blocks, aiming at focusing on a limited number of disease groups in one block" (VR08 page 2 paragraph 44-50)

"... for the objectives and content of the clinical rotations, what students need to learn during clerkships, the number of clerkships, the minimal duration of stay per clerkship and standards for clerkships" (PP08 page 3 paragraph 1.1.1.B)

"A tremendous lot of work has been done since the last visit of Groningen/Maastricht advisors! The scaffolds of phase 2 and 3 of the new curriculum are there: curriculum map, block matrices and block blueprints, rotation matrices.... This is a solid foundation to proceed on!" (RP2 page 1 paragraph 14-20).

Once, the curriculum map and block blueprint for each block were approved, each block coordination team develop a block book for tutor and for students. At the micro level topic tree was developed and trigger problems were identified. Then, weekly instructional design was developed. Blueprint assessment for each block was also plotted to assess the achievement of block learning outcomes.

At macro level, assessment strategy was also designed systematically to ensure that the assessments of achieving competencies components and learning outcomes from various domains were included. For example, for knowledge domain, written tests at the end of block were introduced. The clinical skills were assessed using OSCE method. At the end of the academic phase, there is an integrated skills assessment using OSCE. But, according to Hawkins et al, there is an uneasiness that the existing assessment approach to competencies might

emphasizes or deemphasizes domains important to competence in relation to the availability of various valid assessment methods for the individual competencies.[26] The process of developing systematic assessment is depicted in the following quotes.

> *"Knowledge tests consist of multiple choice and essay questions submitted by the lecturers. All submitted questions are reviewed by the assessment team together with the block coordinator with or without teachers from the block. Criteria are set in advance. After the test an item analysis is done, but no insight is gained in the overall quality of the test. It is recommended to explore whether overall test quality can be obtained with the item analysis. Feedback to the authors of the questions is not yet given. Skills are assessed with OSCEs in the skills lab. Professional behavior is assessed during each tutorial (twice a week). Interestingly, professional behavior is also a component of the entrance test for new students. The assessors are impressed by the systematic approach and perseverance of the assessment team. The main problem with written tests appears to be the meeting of deadlines by the authors of the questions"* (EE06 page 10-11)

> *"In our view one assessment during each block using broad categories for global assessment should be sufficient, which still leads to 16 assessments in the preclinical phase. In addition to assessment by the tutor the number of assessments could be increased by having pairs of students assess each other (peer assessment)"* (EE06 page 11)

Norman et al argue that domains in competency frameworks such as humanism, professionalism, altruism and scholarship are difficult to measure, and consequently may be underemphasized in assessment and then in educational activities.[27] In this study, professional behavior is assessed during tutorial discussion. This might not cover the whole components of professionalism.

Major reform was done with the clinical rotation. It started with developing a curriculum map, followed by distribution of content across clinical departments, based on the learning outcomes. The number of clinical rotations was reduced. Each departmental clinical rotation had learning outcomes – comprising of knowledge, skills and attitude – derived from the competency's components. Based on these learning outcomes, the learning activities during clinical rotation were mapped out. This way, clinical rotation had become more systematic and targeted. Each clinical department developed clinical rotation guidelines elucidating direct involvement of patient care under closed supervision, feedback, and systematic assessment. This is explained in the following quote.

> *"The assessors were pleasantly surprised to see the well-balanced clinical curriculum plan. All learning objectives are clearly presented and divided over the specialties. The students have logbooks that have the same general lay out for all clinical rotations. Students are very much involved in direct patient care, present their own cases and discuss them daily with their clinical supervisors (both residents and staff) during bedside teaching"* (EE06 page 11).

Although the clinical curriculum was carefully thought through, CBME pushed the clinical teaching during the clinical rotation into more structured activities, such as clinical tutorials, bedside teaching, etc. With the increasing number of students, the structured activities seemed to provide learning activities for all students, but this has resulted in the less opportunities for actual practice and direct involvement in patient care. This notion confirms Caccia et al who offer basic principles in clinical teaching underpinning CBME. They argue that during any clinical encounter, there should be direct observation of communication, collaboration, technical skills, diagnostic skills, decision-making, and clinical judgement by the clinical supervisors.[8] The following quotation reflect this.

> *"It is foreseen that with the current number of students a substantial extension of affiliated hospitals and puskesmas is necessary. These developments should result in less class activities and tutorial discussions in white coats as is the actual practice and less rotations within a clerkship in favor of more direct involvement of clerks in patient care. Ideally, this should result in*

supervised responsibility of clerks for a limited number of patients" (MM07 page 4 lines 1-12).

Faculty Development Program

Whilst the process of designing and developing were taking place, the committee responsible for faculty development designed a faculty development programme based on the roles and function of academic staffs. During this phase, training and workshops on 'CBME: the challenges and pitfalls' were most crucial to make everybody understand the rationales behind the whole process of changes. Tutor and instructor training as well as block development trainings and clinical rotation guidelines were also prioritized. The following quotation shows the faculty development efforts.

"The training of block teams to develop CBC modules and the improvement of 21 block book for tutors and students (activity 1.1.2 and 1.1.3) is extended with the feedback on lecture notes as well to allow the GMUFM academic staff to fully implement the new curriculum by September 2007" (IR06 page 9 paragraph 26-31)

"The staff appreciated the educational training that they had received and still receive every 6 months. More staff training would be appreciated (both more staff members and repeated training). We recommend that the staff training that was already initiated be continued and possibly expanded, including the opportunity for staff to meet colleagues and exchange experiences" (EE06 page 13).

This is in line with Dath and Iobst who argue the important of faculty development in the transition to CBME, be at the system level as well as at the individual teacher level.[28]

Learning resources

In conjunction with other developments, a committee on learning resources identified skills lab equipment that had to be procured under this grant, not only for the skills laboratory at FMUGM, but also for outreach teaching hospitals. Assisted by experts from Maastricht Medical School, the layout of skills lab

was redesigned. The instructional materials, such as literature references, skills training guidelines, and block books were also developed. The following quotation reflects the opinion from the external evaluator.

"We are impressed by the quality and "looks" of the block books, the tutor guides, the instructional materials used in the Skills lab, and instructional materials used in the clinical part of the program. We have never seen a more systematic attempt to make the curriculum explicit for students and staff then here at UGM. We conclude this with much respect for all those who made this happen: staff at UGM and technical advisors from Maastricht and elsewhere" (EE06 page 8).

"The Skills lab is a world-class facility in its own right. It is quite amazing how much has been made possible with limited means. Students often mention the Skills lab as the best part of their curriculum. The early training of the doctor's skills gives them the self-confidence to deal with the challenges of the clinical rotations. The young full-time staff makes the impression of being extremely committed and competent" (EE06 page 8).

"Nowadays UGM is equipped with a modern, well equipped skills lab, very well organized with well trained staff. The skills lab and its staff meet the criteria necessary for a fully integrated skills training in the medical curriculum" (FR12 page 14 lines 24-29)

The affiliated teaching hospitals were also equipped with skills training equipment. The idea was that the students could always practice their basic clinical skills, although they were posted in teaching hospitals away from the main campus. The placement of medical students in teaching hospital was well planned based on calculation of the student-patient-staff ratio as explained in the following quotation.

"…for calculation of the number of trainee (koas) posts needed for efficacious active clinical teaching during clinical rotations, f.i. on the basis of desirable student-patient-staff ratio's. On the basis of this model the

number of training posts needed will be determined and consequently the number of affiliated hospitals needed. In addition, a proposal shall be formulated how to organize the clinical rotations in terms of distribution and duration of stay" (PP08 page 3 paragraph 1.4.1.A).

Implementation

The implementation of CBME started with the batch 2007 Semester 1, whilst other semesters were still using the old subject-based curriculum. The implementation in semester 1 could be seen as a 'try out phase'. While the semester 1 was running, all the committees were preparing for all components needed to run the semester 2. At the end of each block, the evaluation team did the block evaluation and the results were immediately fed back into the next block. This way, a gradual expansion was taking place as the students moved up the semesters as shown in the following excerpt.

"During the Project, the curriculum was redesigned to make it more aligned with the competence-based philosophy. Following that, various infrastructures needed for the successful implementation of a competence-based curriculum had been preprared. The new curriculum was introduced in 2007 Batch in the undergraduate programme in medicine using Standards of Competence. Clinical skills, communication and attitude training had to be adapted or newly developed to be fully integrated into the undergraduate programme" (FR 12, page 11, lines 10-18)

Monitoring and Qualitative Evaluation

Monitoring and evaluation were conducted by the external evaluators. The project hired renowned international experts to do the external evaluation qualitatively. The results demonstrated that the new curriculum was more enterprising. The students became more curious, they had better communication skills and had more self-esteem. The external evaluators also observed that the students had higher level of clinical competences and enjoyable learning environment. They commented that tutorial discussion did work, because they presumed that

in the Asian culture where power distant is high, tutorial discussion might not work as good as in the western countries with a more egalitarian culture.[29] The following excerpt illustrate this.

"For instance, some clinical teachers have observed that the first batch of students from the 2002 curriculum is more enterprising, more curious, and communicates better with patients during the clinical clerkships than previous batches of students. Others relate that students seem to have more self-esteem and are more at ease with patients. In addition, it is felt that the students have acquired much higher levels of clinical competencies, not in the least because the greatly expanded Skills Laboratory has enabled the development of such competencies. Most colleagues and students we spoke with agreed that the problem-based medical curriculum at Gadjah Mada University provides a learning environment that is most enjoyable for both students and teachers" (EE06 page 2)

The following quotations reflect students' opinions.

"I love to discuss the subject-matter with my friends in the tutorial. It helps me understand the issues much better. It's much easier to ask questions in the group than during lectures"
"The tutorials lead to deeper learning and better integration."
"The best thing of the UGM-system is the integration between the basic and the clinical sciences. It helps you put the knowledge to use."
"It's two-way traffic here. Students and staff are very close. My friends in Malaysia who are in medical school there tell me that they have never spoken to a member of the staff."
"The shy students learn to feel at ease here and become self-confident. I learned to speak up in the group and to actively contribute."
"I like that the training is so practical. Also, with the Skills lab (EE06 p 4)

From the students' perspectives, the students perceived to have deeper understanding, more opportunities to discuss the issues, better integration of basic and clinical skills. They also had more opportunities to directly apply their knowledge.

They also felt to have closer relations with the staffs. From the tutors' perspective, they perceived that the new education approach drove them to update their knowledge.

The following excerpts illustrate the external evaluator impression of the CBME.

> "The assessors are very impressed by the curriculum as it is in its current state. It is a modern curriculum that not only is designed carefully, but also appears to be viable in the daily reality of teaching and learning in a professional environment (EE06 page 16).

> "Our own observations of small-group tutorials corroborated these opinions of students and staff. We were struck by the quality of the discussions, by the inviting and informal atmosphere in which the discussions took place, and by the fact that the group members all actively participated in the discussion" (EE06 page 5)

3. Cultural Changes

With regards to cultural changes, there were enabling factors. The presence of Maastricht and Groningen Medical Schools were seen as the mentor and the coach. They adopted the approach that was more demand-driven, flexible, and local ownership instead of imposing their thoughts and experiences. This had made the academic staffs at FMUGM more confident, more cooperative and more receptive to the new approach of CBME. The role of departments was strengthened. This also had provoked more involvement of the departments during the curriculum design and preparation. During the running of the project, the deanery had always been supportive of the adoption of CBME and had exercised strong leadership to direct the changes under the guidance of Maastricht and Groningen Medical Schools. Negotiation and consensus were part of the process and these were allowed to occur making academic staffs felt herd and appreciated. The following quotations illustrate this phenomenon.

Enabling Factor

> "After having been co-operating for several years with the experts from UGM, it is felt that these experts do

gain enough knowledge and skills to further develop their curriculum. Consequently, it is felt that the time of carrying out trainings and instruction courses should be decreased as much as possible, and that a move forwards should be made towards a 'coaching-approach'. In other words, after telling, showing and involving, the experts from the Netherlands do need to make a step back for further support UGM in their educational reforms" (MM07 page 2 Lines 10-16).

> "Which previous suggestions for improvement of the phase 1 blocks have been implemented and which not? This is important for us because we want to learn from you why certain suggestions don't work in GMU. We want to prevent misunderstandings and frustrations" (RP2 page 2 paragraph 22-31)

However, there were inhibiting factors that could hinder the progress of CBME implementation. Some of the senior academic staffs still had subject-based mindset. It was understandable as they were going through this curriculum models for dozens of years. However, they were deliberately intensely involved and were given responsibilities as chairs of committees. Other inhibiting factors were long hours of working and multiple commitments from the academic staffs. Although they showed enthusiasm, but the bureaucratic regulations pushed them to have multiple commitments and responsibilities.

Inhibiting Factor

> "A major problem facing those who attempt curriculum renewal is how to deal with the expectations of the different departments that were responsible for the teaching of the old curriculum. To increase the chances of success, the innovators did a smart thing: They kept the magnitude of the contributions of the departments intact, only redistributed the teaching activities throughout the curriculum where they would be relevant. This was a clever move because it diminished interdepartmental quarreling about how much subject-matter" (EE06 page 2-3)

> "In the development of the new curriculum, there still seems to remain a tendency to try to cover all the competencies to be mastered by a general practitioner

in the preclinical curriculum. This does incorporate a risk of student-overload and fragmentation. Choices do need to be made to avoid this" (MOM07 Lines 42-45)

"We also realized that: There is a natural and quite understandable resistance within the departments to the proposed student-oriented changes in the curriculum. As far as we can see this resistance may well be caused more by an overload of tasks for individual staff members than by a resistance to change as such" (MOM07 lines 30-36)

From students' perspectives, the following are the inhibiting factors.

"Heavy study load, lack of basic knowledge to get proper discussion during tutorials, Not well instructed tutors, limited access to internet through hotspots, postponement of lectures and even tutorials, assignments which were not clear to them" (VR 08 page 2 lines 11-27)

"Like tutors, instructors experience difficulties being available at times agreed upon. Therefore, students are confronted too many times with last-minute replacements of these instructors, replacements who are not always well prepared. It would be better to either pay instructors directly for educational services rendered to the Skills lab ("fee for service"), or increase the number of full-time instructors. This would ensure continuity of the skills curriculum and optimal quality of the instruction" (EE06 page 9-10)

Literatures also suggest that enabling and inhibiting factors exist when moving towards CBME, such as Caccia et al,[8] Hawkins et al,[26] and Griffiths et al.[30]

The paradox of a new curriculum

The paradox of new curriculum is when new curriculum solves the old problems, but at the same time also create new problems. In this regards, the administrative and bureaucratic regulations from the Government were not quite in line with the principles of CBME.

"A new curriculum solves some old and pertinent problems but it also creates some new ones. In the remainder of this report we will list some of these new problems and suggest avenues for improvement. Of course, we will throughout also report on the many things we found to be particularly positive developments" (RI06 page 2)

Quality assurance

To sustain the changes, quality assurance unit was established and equipped with full time administrative staffs. A dedicated team was appointed to execute the quality assurance functions. The following excerpt reflects how a quality assurance process function.

"Finally, a feedback-loop has to be developed to improve block programs, books and teaching materials of curriculum year 1 on the basis of feedback from students, tutors and instructors has been collected." (MM07 page 3 lines 1-7)

Schelle et al.[31] agreed the importance of installing a quality assurance measures when implementing CBME.

CONCLUSION

This study explores the changes that took place during a curricular reform from subject-based curriculum to CBME in a faculty of medicine from three aspects. The changes are complex and involve the whole system. In the first aspect, i.e. organizational and structural changes, four themes were identified consisting of the role of central authority, multidepartment committees, committed change agents and decision-making procedures. With regards to the second aspect, namely curricular design, implementation and evaluation, five themes emerged – curriculum design at macro, meso and micro level, faculty development programme, learning resources, implementation and monitoring and qualitative evaluation. As for the third aspect – cultural changes, there are four themes identified, namely enabling factors, inhibiting factors, paradox of the new curriculum, and quality assurance.

RECOMMENDATION

The kinds of changes that took place during the design and implementation of CBME have been elaborated based on empirical evidences. These changes can be used as references, inspirations, or planning by any medical schools who are about to embark on implementing CBME which could increase the possibility of success. These changes can also be referred to by universities or national governments to provide supports for the medical schools adopting CBME.

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TThe first author was the project manager from the FMUGM side, the second author was involved in the development of clinical skills training and the third author was the project manager from the Maastricht Medical School side. There is no conflict of interest. These positions provide better understanding of the process and in interpreting the documents in accordance with the context.

AUTHORS' CONTRIBUTION

Titi Savitri Prihatiningsih – developing research proposal, selection and collecting documents, qualitative data analysis as the first coder and final themes, and write publication manuscript.
Hikmawati Nurokhmanti – qualitative data analysis as the second coder.
Geraldine Baujean – review the draft manuscript.

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