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Workplace-based assessment and students' approaches to learning: a qualitative inquiry

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Abstract

Background: We have performed this research to assess the effect of work-place based assessment (WBA) practice on medical students' learning approaches.

Methods: The research was conducted at the King Saud bin Abdulaziz University for Health Sciences, College of Medicine from 1 March to 31 July 2012. We conducted a qualitative, phenomenological research utilizing semi-structured individual interviews with medical students exposed to WBA. The audio-taped interviews were transcribed verbatim, analyzed, and themes were identified. We preformed investigators' triangulation, member checking with clinical supervisors and we triangulated the data with a similar research performed prior to the implementation of WBA.

Results: WBA results in variable learning approaches. Based on several affecting factors; clinical supervisors, faculty-given feedback, and assessment function, students may swing between surface, deep and effort and achievement learning approaches. Students' and supervisors' orientations on the process of WBA, utilization of peer feedback and formative rather than summative assessment facilitate successful implementation of WBA and lead to students' deeper approaches to learning. Interestingly, students and their supervisors have contradicting perceptions to WBA.

Conclusion: A change in culture to unify students' and supervisors' perceptions of WBA, more accommodation of formative assessment, and feedback may result in students' deeper approach to learning.

Introduction

Newble presented the statement "Assessment Drives Students' Learning" for the first time in 1983 (Newble 1988). Since then, this statement is viewed as confirmed. Reviewing the educational literature, the effect of assessment on students' learning approaches is still inconclusive (Norman et al. 2010; Al-Kadri et al. 2012).

Studies on students' learning approaches have focused on the effect of teaching-learning environment (Biggs 1999). They have investigated the various ways students interpret the requirements of a task within a specific learning context (Marton & Saljo 1997). Moreover, researchers have emphasized students' self-conscious reflection on their studying, drawing on the ideas of "meta-cognition" and "self-regulation" (McKeachie 1990; Vermunt 1996, 1998). Students' study approaches were then categorized as deep, reflective and elaborative approach and superficial with serial, reiterative, or rehearsal approach. A third approach of studying that describes analytical and organized studying was initially called a strategic approach or an assessment-driven learning approach. Students were believed to exert effort in response to certain motivations and aim for certain achievements, including their assessment-related achievements. Therefore, this particular learning approach was called "effort and achievement motivation approach".

Practice points

- Various stakeholders involved in the use of WBA have major effect on students' perception of WBA and their resulting learning approaches.
- Students and supervisors have contradicting perceptions on the effect of WBA on students learning.
- Summative WBA leads to dominating strategic learning behavior.
- Clinical supervisors' effect on students' learning in the work place is independent of the practice of WBA.
- Peer assessment and feedback may help in sorting out the logistic difficulty related to WBA implementation.

The blooming beliefs in the strong effect of assessment on students' learning resulted in a heavy and enthusiastic utilization of assessment quality assurance methods or "the psychometric theories". These theories focus on factors that are related to assessment quality (Schuwirth & van der Vleuten 2004), and have resulted in several important quality indicators, e.g. reliability (Van der Vleuten et al. 1991) and validity (Messick 1984). In general, the psychometric theory indicators have aimed to guarantee that we are testing what should be tested and covering curriculum objectives.

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The wide implementation of the psychometric theories has led to higher popularity of summative assessment compared to formative assessment. However, the most remarkable outcome of this theory was the growing focus on test quality and score interpretation rather than the resulting students' learning approach or educational impact (Cowie & Bell 1999;Schuwirth & van der Vleuten 2004). In fact, the psychometric theory have influenced both teachers, particularly their teaching methods that were transformed to be more test oriented (Harlen 2005), as well as students whose learning approaches were influenced by more rehearsal reiterative practice (Harlen 2005).

Assessment became a method to rank students or determine their pass/fail rather than an instrument to enhance their learning, making it an "assessment *of* learning". Medical educators then started to look for a solution to the dilemma of assessment of learning. They worked on creating an assessment theory that helps in implementing a comprehensive assessment characterized by enhancing students' learning. This strategic approach to the implemented assessment was called "assessment *for* learning".

In the clinical context, assessment of learning is used to pass or fail the student while assessment for learning is implemented to get the students live through real clinical experiences and learn how to solve them on a day to day basis (Miller & Archer 2010). An extensive literature review that assessed the published literature on clinical context assessment, WBA, and students' approaches to learning, indicated that scientific evidence on the effect of assessment on students' learning is scarce (Al-Kadri et al. 2012). In previous publications (Al-Kadri et al. 2009, 2011;Kadri et al. 2011), several extrinsic factors contributing to students' perception of their assessment in a clinical context were assessed, such as students' culture, curriculum objectives, clinical supervisor and supervision, as well as intrinsic factors such as task demand, motivations, and task goals. These studies found that assessment drives students' learning, though not necessarily in a positive way. In fact, it was frequently providing a negative drive. Students' learning approaches in response to their clinical assessment were found to be unstable and swinging between the three different approaches.

Recently, Cilliers et al. (2011) established a model describing the pre-assessment effects of summative assessment in medical education. They have also validated this model in a clinical undergraduate context. Their results indicated that there are multifaceted interactions between factors influencing students' learning. However, their model did not specify the effect of WBA on students' learning, rather, that the work emphasis was stronger on the effect of summative assessment on students' learning. Moreover, Norcini et al. (2003) recognized WBA to carry acceptable reliability and validity, reflect reality, and to test the students in the place of patients' care. However, literature did not confirm WBA's effect on students' learning approaches (Al-Kadri et al. 2012).

Finally, when Miller & Archer (2010) conducted their systematic review on the impact of WBA on doctors' education and performance, they indicated that multisource feedback can lead to students' performance improvement. They have also indicated that the literature reviewed by them did not provide evidence on the effect of other workplace-based assessment tools such as mini-clinical evaluation exercise (Mini-CEX), direct observation of procedural skills (DOPS), and case-based discussion (CBD) on students' learning.

From the above, we can note that little is known about the manners at which students carry out and regulate their learning functions in response to WBA. Further researches that cover this important aspect of students' learning appear to be needed. Therefore, we have conducted this work to assess factors contributing to undergraduate medical students' learning approaches in response to WBA.

Methods

We performed a phenomenological study to assess the life experience of students when exposed to the influence of WBA in a community of clinical practice. We evaluated students' perceptions through in-depth semi-structured individual interviews to have a clear idea on their opinions while avoiding any bias resulting of other student's influence.

Study setting

The study was conducted at King Saud Bin Abdulaziz University for Health Sciences (KSAU-HS), College of Medicine (COM), Riyadh, Saudi Arabia, during the period 1March to 31 July 2012. The college is located within King Abdulaziz Medical City, a 1000-bed tertiary care center. The KSAU-HS, COM curriculum is a Problem-Based Learning (PBL) curriculum. The college accepts two main streams of students, stream I consists of secondary school students and their program is a six years duration; two years of pre-professional studies, two years of pre-clinical modules, and two years of clinical modules. Stream II students' curriculum is a four-year graduate entry program consisting of one semester of pre-professional studies to be followed by two pre-clinical module and two years of clinical education module. The two streams' pre-clinical and clinical modules are identical in content and delivery. During the clinical year modules, the educational activities of both streams include workplace learning and feedback where the students have to complete successfully five main clinical blocks. Each block is built of several general and subspecialty clinical attachments where the students practice their blocks' educational objective, are supervised, given feedback, directed, and assessed by clinical supervisors. As no female student has reached phase III of the curriculum (the female curriculum has only started recently), our studied population was all male students.

Assessment program

The assessment program of the clinical years at KSAU-HS, COM is block-based. In each block, students' assessment is composed of two main parts: Continuous block assessment of students' performance in the block's different clinical attachments accounts for 40% of the final grade, and the final block assessment accounts for 60% of the final grade.

The continuous block assessment is structured as follows. During each clinical block, supervisors perform several events

of WBA for each student; two Mini-CEX and two CBD, each one of these WBA events is followed by individual formative feedback on the student's performance during the exam. Each student is allowed to comment on his feedback and the process of the exam. Furthermore, during each clinical attachment, supervisors directly observe students' different practical skills performance (DOPS) based on the attachment objectives and provide students with the necessary guidance and feedback. Moreover, by the end of the clinical attachment, students are asked to meet with their clinical supervisors individually and are expected to receive verbal and written qualitative formative feedback on their overall practical performance during that attachment.

In the present paper, the term "summative assessment" refers to an assessment performed to assign students a course grade, "formative assessment" refers to an assessment as an educational tool to aid students' learning without grading them, "WBA" refers to the use of Mini-CEX, DOPS and CBD, "continuous assessment" refers to an assessment of students' progress based on work they do or tests they take throughout the clinical blocks.

Study population

Students were recruited by a stepwise purposeful sampling approach. Sixty male students who had experienced the assessment program of the clinical years during the academic year 2011–2012 were invited to participate in the study. One student attended each interview at a time to allow more freedom in expressing of ideas and to avoid bias. Moreover, the research results were presented individually to randomly selected clinical supervisors who have contributed to the interviewed students clinical teaching and WBA. All interviews were done by the principal investigator and a co-investigator.

Data collection

Students were asked to talk about their perceptions of the implemented WBA and how their experience with WBA affected their learning activities and approaches. Each student interview lasted about 30–45 minutes. We benefited from our preliminary analysis of the interviews in identifying new open-ended questions for subsequent students' interviews. We continued conducting semi-structured individual interviews until we reached data saturation. The interviews were audio-taped, and field notes were taken during the interviews. The audio-tapes were transcribed verbatim. This process was repeated for all the individual semi-structured interviews that were conducted.

Data analysis

The transcriptions of the interviews were analyzed thematically and were managed using Atlas-ti (Version 5.2) computer software. Analysis involved line-by-line scrutiny of the transcript and assignment of keywords to the identified text. For each interview, themes and sub-themes (codes) were identified; these themes and codes were subsequently tested and further refined in a cyclic process, moving longitudinally backward and forward between the assigned texts and transversely between the different themes and codes, resembling the open coding and axial coding phases of grounded theory (Strauss 1987). To achieve a more complete and comprehensive picture of the analyzed data, we performed investigators' triangulation by having a co-investigator code three interviews independently. The resulting minor disagreement was resolved by discussion. Furthermore, we improved the credibility and transferability of the data by member checking. The results were presented to a group of students who were asked to give feedback. Students' feedback was generally in agreement with the obtained themes and codes. We have presented the research results individually to seven clinical supervisors who have contributed to the conduction of the interviewed students' WBA. We have triangulated between students' analyzed data and their supervisors' aiming to assess (1) supervisors' opinions of the students' perception of this type of assessment and the resulting students' learning approaches; (2) supervisors possible effects as WBA examiners on students learning approaches. Finally, the results of this research were triangulated with a similar research that was conducted in the same institution while the same curriculum is conducted but prior to the implementation of WBA (Al-Kadri et al. 2009, 2011). Ethical approval for the conduction of this research was obtained from the King Abdullah International Medical Research Center.

Results

We started interviewing the invited students based on their convenience and availability. Twelve students were interviewed after which we reached data saturation and additional interviews were not adding appreciable new information and new themes were not appearing during the analysis. In order to gain added confidence, we conducted and analyzed three additional interviews at which no new information was emerged. The contributing students' mean age was 22.17 years compared with mean age of 22.32 for those who did not contribute. Seven supervisor interviews were also conducted, after which no new theme was obtained. Both teachers and supervisors interview analysis revealed three major themes along with their related codes. These themes have significant factors contributing to students' perception of their WBA, and their resulting learning approaches (Table 1). Identified themes were "Clinical supervisors", "Faculty given feedback", and "Assessment function". We present these themes with illustrative quotes from students (ST) and supervisors (SU).

Clinical supervisors

In preparation for the WBA, students tend to explore not only the clinical exam that they will face, rather they do work on gathering information on their examiners, their personalities, difficulties, and preferences. Moreover, they explore examination details from previous batches of students. Based on the gathered information, students tend to plan their exam preparation. This preparation usually varies between few hours of reading and several days of hard work exploring hospital patients, clinical cases, group studying, attachments

Table 1. Factors contributing to students' perception of the implementation of WBA and the resulting learning approaches.

Themes	Codes
Clinical supervisors	Supervisors orientation Curriculum objectives Hidden curriculum Stress Learning outcome
Faculty given feedback	Negative feedback Positive feedback Peer feedback
Assessment function	Formative assessment Summative assessment Summative culture and test reliability

with senior students, interns, residents, and even attachments with the examining supervisors.

In the presence of a supervisor who is known to be strict about exam preparation and conduction, gives constructive feedback to his students, is aware of the curriculum objectives, and more importantly well oriented to the process of WBA, students tend to read and analyze about the clinical cases, discuss their management with each other and with seniors, and reflect these discussions on different patients' management. Therefore, despite the stressful situation of facing their supervisor during the exam, students tend to practice a deep approach to their learning through reading, practicing, linking, and analyzing. On the contrary, attachments with clinical supervisors whom are poorly oriented to the WBA process, result in students' tendency to surface approach to learning.

> . . . before any Mini-CEX or CBD exam, we start asking which supervisor will examine us, try to get some answers, some hands-on from the supervisor himself. We explore if the supervisor is malignant or harsh, ask previous batches, and ask his previous students and the students currently on rotation with him. We clarify information on his mood, what does he like, what he doesn't, the topics he prefers. Then we read the topics that are likely to come in the examination, do physical examinations even if not on patients, we do it on each other. My study group and I usually gather in someone's house and try to master these skills within few days. We then go to the wards and focus on practicing on real patients, discuss their management and get ready for all exam possibilities. (ST)

Students tend to carefully map their study plan in response to their supervisors' personalities and the resulting exam-induced stress. In fact, students used to select their own study objectives, neglecting the clinical block educational objectives, resulting in a hidden curriculum. The clinical supervisors whom commented on the research results found students' approach to their difficult attitude as positive and valued their tendency for deep approach even when it was directed toward selected objectives and aimed towards mark hunting.

> You know, there are malignant supervisors and benign ones. I read well for both, but the malignant ones make me read more on their specialties and care more for their patients. (ST)

Clinical supervisors have the responsibility of delivering the intended curriculum objectives and guaranteeing its educational outcomes. Students rely on their supervisors for skills transfer, reading guidance, and linking the delivered theoretical knowledge to their clinical practice. Therefore, practicing their role properly helps students to turn their surface learning approach into a deep one through guidance, role modeling, and directions. Appreciating their supervisors' important role while practicing WBA, students preferred to increase the number of instances they are exposed to WBA.

The interviewed students and their supervisors who commented on the results did not agree on the overall preferred number of WBA sessions required during their clinical training, but they have agreed on its role in students' engagement in clinically relevant learning and skills enhancement.

> I suggest increasing the number of Mini-CEX and CBD as they help in improving my clinical skills and obtaining confidence to care for a patient on my own. These exams are a chance to prove myself as a physician. So, even if I do good or bad it usually challenges me to go forward. (ST).

Faculty given feedback

Most of the students have valued their WBA supervisor providing feedback, particularly the positive ones. Some students considered it superior to the exam assigned marks. It helped students identify their weaknesses and the areas where they really shine and gave them a clue on ways to improve.

> Some physicians yeah, they know the real goal of the Mini-CEX and they teach you a lot. Even if you don't get that good grade, you performed bad or you didn't prepare well, they will teach you the right way to practice your skill and educate you more to become skilled, confident, and able to manage patients. (ST).

On the other hand, it was difficult for students to accept direct criticism and negative feedback. Overwhelming practice of negative feedback by the supervisors had negative influence on students' performance and was found to lead to undesirable results. Students may become hesitant to study and to interact with their supervisors in order to avoid another negative comment, and to practice patchy reading resulting in a tendency to surface approach to learning.

> It makes my performance worse, because they only think of the bad things; you did this wrong, and you did that wrong. They don't even tell me what did I do right. (ST)
>
> Supervisors did not agree with the students' negative response to their negative feedback being an important method for the students to identify their mistakes and improve on their performance.

> There is no nice way to tell them that, they need to know what did they do wrong to avoid it in the future. (SU)
>
> When WBA is done in the presence of peer students attending the exam, peer feedback was valued as an alternative source of WBA feedback. It plays a major role in covering the chronic deficiency of feedback by busy clinical supervisors and therefore gets the practice of WBA to its optimum. The observing students give their peers more focused feedback compared to their supervisors.
>
> Happy with the clinical assessment, yes, because I use my feedback. In fact the most beneficial feedback I got is from my colleagues who attended my exams. They are honest with me and talk at my level. I benefited from colleagues' feedback more than my supervisors'. (ST)

Students' utilization of peer feedback in WBA eases the task of timely delivered feedback, helps to increase its frequency, and assist in continuously improving students' approaches to learning without overloading the assigned clinical faculties. However, supervisors hesitantly agreed with the students' suggestions adding some restrictions and roles.

> I will agree to add few supervised Mini-CEX and CBD with peer feedback, but I will not give it any importance. (SU)

Assessment function

Students have differed in their perception of formative assessment in general and the utilization of WBA as a formative assessment specifically. Some students believe in the effect of WBA on their future clinical performance, obtain feedback that will help them improve, progress and gain further confidence to face real patients in a real setup.

On the other hand, supervisors have supported summative WBA to deliberately induce a deeper approach of students' learning. What was prominent in the supervisors' comments is their strong tendency to consider WBA as pure assessment events without identifying its important teaching-learning role, particularly its role in feedback.

> I am a tough examiner, it seems that this is working with our students, If I will consume my time and conduct more of these exams, it should be summative. But then I need time to be assigned for that, I should be free when I do it. (SU) and The mark is the most important feedback, if they do well, they will get good marks. (SU)

Students perceived their achievement in WBA as dependent, mainly on who is examining them and the utilized clinical case difficulty. It appears that students are not well oriented on WBA to clarify the principles on which WBA is designed and the effect of multiple examiners encountered through multiple examinations in improving the test reliability and fairness.

> I think our supervisors don't really know the objectives that we should be tested upon, and there is no unity between all supervisors in conducting this clinical assessment. So, I might be examined by supervisor A, who gives me a case of pneumonia, and my poor friend in the next room can have a case of malignancy. I might as well be examined by an examiner who is so nice, and my friend in the next room may get a difficult examiner. So if I get the easier one, I get a high mark. The other guy who was not really prepared to have a difficult malignancy case will not score well. (ST)

Some of the students and even supervisors did not appreciate the difference between OSCE exam and WBA in terms of their reliability, fairness, and benefits. They were not well oriented to the WBA process, its steps, and steps justifications. They did not understand its benefits, and did not recognize the differences between assessing does and assessing knows how on Miller's pyramids (Miller 1990). It was clear that students and even their supervisors do require a well-designed orientation on WBA characteristics, benefits, process, and feedback.

> Scoring in OSCE exam depends also on the examiners but it is more fair than the Mini-CEX. For example, all the students will pass through the same examiners. (ST) and The suggested orientation sessions need to be for both students and supervisors. (SU)

Discussion

In the community of clinical practice, several factors were found to contribute to students' perceptions of WBA and their selected learning approaches. Students tend to practice the effort and achievement motivation learning approach in response to their supervisors' personalities and preferences. This in turn led to students' selection of particular learning objectives and the development of a hidden curriculum. On the other hand, WBA's positive feedback led to a deeper approach to learning compared to a negative feedback. Contradicting their supervisors, students tend to prefer peer feedback being at their level of understanding and being free from embarrassment or penalties. They also prefer WBA to be utilized formatively for more effective enhancement of deeper approach of learning. The contradiction in opinions between the students and their clinical supervisors in this research was striking. These contradictions revolved mainly around the role of assessment function, the role of supervisors as teachers, source of feedback, and examiners on students learning approaches (Figure 1). It appears that both students and their supervisors are living in two different words, perceiving WBA process and its drive of students' learning differently.

Reflecting this work results on our previous published researches (Al-Kadri et al. 2009, 2011), the presence of a community of students and supervisors in a clinical context creates the social fabric of students' learning, as well as relations and interrelations with their surroundings. In a clinical work place, clinical supervisors' encouragement, guidance, coaching, availability, critical reflection on students'

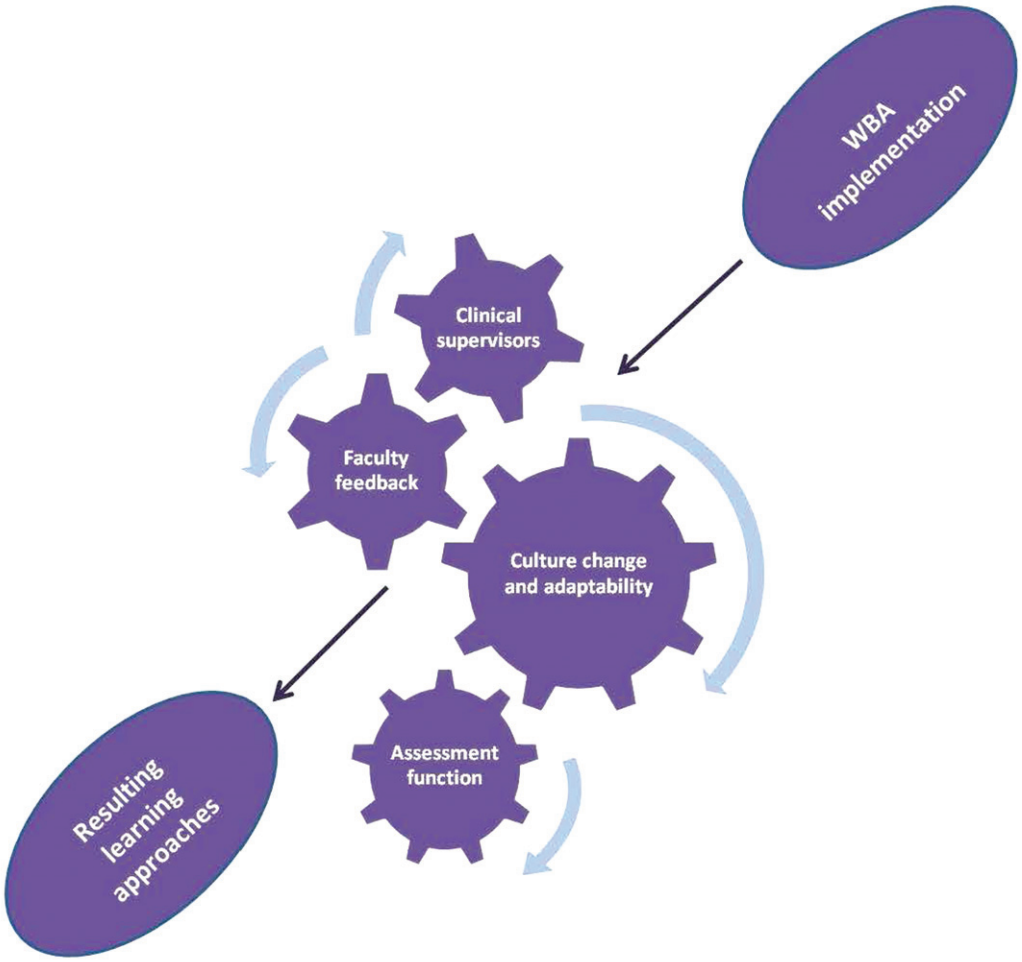

Figure 1. Framework of the effect of WBA implementation on students learning approaches.

practice, and the way they supervise, are all important sources of knowledge and skills that influence students' learning (Marrow & Tatum 1994; Al-Kadri et al. 2011). On the other hand, lack of supervision deprived students of essential educational support (Kennedy et al. 2009), and increased students' tendency to utilize a surface approach of learning. It appears that clinical supervisors' effect on students' learning and learning approaches in the work place is independent of the practice of WBA. Rather, it is mainly related to the efficiency of the supervisors' supervision, their personalities, knowledge about the practiced assessment and their assessment responsibilities (Al-Kadri et al. 2009).

Although examinations, grades, and direct interactions with patients were perceived very stressful (Al-Kadri et al. 2009; Kumar et al. 2009), WBA on its own was not perceived as such. WBA was found to result in a variable degree of stress that is related to the summative effect of the practiced assessment (Al-Kadri et al. 2009; Cilliers et al. 2010), leading students to effort and achievement learning approach or superficial approach to learning. Similar to our previous research (Al-Kadri et al. 2009), the teachers in this study saw more advantages of summative WBA than the students. Therefore, students' optimistic view on the effect of WBA in inducing deeper approaches to learning and improving clinical performance is compromised by the negative effect of summative assessment (Miller & Archer 2010; Al-Kadri et al. 2011).

Formative assessment is known to produce significant increase in students' gains (Dylan & Thompson 2008). Several meta-analyses have reported formative feedback as the most powerful single effect on students' achievements (Hattie 1978; Hattie & Jaeger 1998; Veloski et al. 2006). This is true in general and is maybe applicable on WBA formative feedback. The information processing needed for students to accommodate feedback results in deeper approach to learning (Sandberg & Barnard 1997). A good example of deep learning process resulting from feedback may be the complex knowledge and skills acquired based on WBA: counseling skills, managing, interacting and communicating. However, several barriers may prevent effective feedback implementation; absence of a clear understanding of feedback, inadequate supervisors skills, and students' fear of negative feedback insult are major barriers preventing the desired students' gains (Al-Haqwi et al. 2012).

In fact, feedback should be delivered in a culture of mutual respect between both provider and recipient. When such culture is built, teaching feedback results in improving students' skills in feedback delivery and enhancing their comfort with feedback, negative and positive alike (Kruidering-Hall et al. 2009). On the other hand, it appears

that some supervisors are not keen enough to improve the effectiveness of their feedback. They tend to believe that their role is to teach critical thinking and reasoning rather than guiding, assessing and monitoring students' progress through loops of constructive feedback (Koh 2008). Even when these supervisors put effort to deliver feedback, they might not work to guarantee that their feedback is constructive and appropriately delivered, the students have understood, appreciated and accommodated their feedback and that the needed corrective actions were taken (Koh 2008). Therefore, it is worthwhile investing the time and effort explaining to our supervisors the clear intention of feedback, the correct constructive feedback process, how will this process enhance the quality of students' learning and enhance the implemented summative and formative assessment (Koh 2008).

Overall, existing research on the effects of summative and formative assessment on students' learning is unequivocal. Whilst some researchers claim that formative assessment is more effective than summative assessment in enhancing students learning (Rushton 2005), others disagree (Hattie 1978; Torrance & Prayor 1998). This unequivocal effect is persistent between both students' and teachers' perceptions of assessment function. In fact, the problem is not only formative versus summative assessment, rather the answer of the following question: "are we really ready for formative assessment implementation?" Successful accommodation of formative assessment and feedback is influenced by several external and internal factors, such as self perception, emotion, reflection, and professional culture (Rushton 2005; Sargeant et al. 2008). These different emotional and cultural factors might have contributed to our supervisors' reluctance to accommodate formative assessment, students' failure to accommodate negative feedback, might be behind the contradicting students' and supervisors' perceptions of WBA process, implementation, and effect, and might be affecting supervisors' perception of WBA as summative type of assessment, and in perceiving WBA marks as sufficient feedback to students' learning (Shute 2008).

Peer assessment and feedback has gained positive perception by students in this research. It is known to improve students' understanding of the course materials, improve their meta cognition skills, and save teachers' time. Our students consider their peer assessment and feedback as beneficial, in that it creates positive rather than competitive and punishing atmosphere (Ferrari et al. 2011; Harris 2011). On the other hand, students' supervisors have declared lack of time and commitments as important obstacles that hinder the implementation of WBA. It appears that utilizing peer assessment and feedback as part of WBA process may actually reduce students' anxiety, provide a positive atmosphere and sort out issues related to supervisors' time limitation. A systematic review on students' peer assessment in medical education, revealed that there is great diversity in the application of peer assessment with major concern related to its reliability and validity (Speyer et al. 2011). Practical and well-designed supervisors' benchmark or WBA peer assessment guideline is required (Finn & Garner 2011).

A limitation to this study is that the studied population was all males. We are not aware of a study that has compared males with females concerning the study strategies resulting of WBA, subject for future research. Another limitation is the lack of evidence on the effect of different learning approaches resulting of WBA on students' educational outcome, subject for another research. This research is based on one institution experience with WBA being used as part of the assessment program. To have highly transferable results, we recommend a similar research on a larger scale that includes mixed sample of students from different medical colleges. Finally, we are not really sure of the effect of different assessment regimes and their influence on students' perception of WBA and the resulting learning approaches, subject of another future research.

Conclusions

Various stakeholders involved in the use of WBA have major effect on students' perception of this clinical assessment and the resulting students' learning approaches. Students and supervisors have contradicting perceptions on the effect of WBA on students learning. Generally, WBA leads to deeper approach to learning if practiced independent of any summative effect, while summative WBA leads to dominating strategic learning behavior. Students tend to take specific contextual elements into account and adjust their learning accordingly. Moreover, peer assessment and feedback may help in sorting out the logistic difficulty related to WBA implementation, subject to regulating guidelines. Finally, effort to unify students and supervisors perception of WBA through preparation and orientation with avoidance of major summative effect may lead to cultural change, better WBA acceptance and accommodation, and better students' learning approaches.

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Notes on contributions

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