

# An investigation of pharmacy student perception of competence-based learning using the individual Skills Evaluation and Development program, iSED®

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## Abstract

**Background:** The Objective Structured Clinical Exercise (OSCE) is the mainstay of clinical competence evaluation of healthcare professionals. The iSED® (individualised Skills Evaluation and Development) program, developed by Leicester School of Pharmacy, embraces various learning theories and was conceived to enhance the OSCE experience and facilitate students' self-regulation in developing clinical competence.

**Aim:** To explore pharmacy students' experience of using iSED® to develop clinical competence.

**Method:** Data were collected using a mixed methods study comprising an attitudinal Likert-style questionnaire, completed by second year MPharm students at Leicester School of Pharmacy, and focus groups with second year and third year students.

**Results:** Students expressed a positive perception towards iSED®, characterised by three emergent themes: 'Visualisation and nature of feedback', 'Self-regulation and cyclical learning', 'Seeing yourself as others see you'.

**Conclusion:** Experience of iSED® supports clinical skills development through objective self-observation against a gold standard and facilitates understanding of individual learner identity.

**Keywords:** *Competence, iSED®, Skills, OSCE, Self-Regulation, Feedback*

## Introduction

iSED® (individualised Skills Evaluation and Development) is a web-based learning diagnostic, developed by Leicester School of Pharmacy. iSED® aims to capture, extend the benefits and address some limitations of the Objective Structured Clinical Exercise (OSCE) when used formatively in a teaching context and to aid self-regulated learning for the individual student. The conception and development of the iSED® tool has arisen from some of the theory associated with experiential learning and the values of formative feedback and development associated with OSCEs.

An OSCE, involving role play with a simulated (or standardised) patient, can be used to test many components that are considered necessary for a successful pharmacist-patient interaction when responding to symptoms, including; communication skills, symptom knowledge, product awareness and counselling skills, that together build a picture about degree of competence of an individual student. There has been much research and discussion about the benefits of OSCEs and the means used to assess competence in OSCEs, including the relative merits of checklists versus global rating scales for the summative evaluation of performance. The balance is currently in favour of global rating scales to assess skills of practitioners or advanced learners, where multiple OSCE stations and well-trained expert assessors are used,

to ensure consistency and process validity (Wass *et al.*, 2001; Malau-Aduli *et al.*, 2012).

There are challenges in using OSCE simulations in education, to evaluate more complex aspects of professional competence and professionalism that are inherent in the uncertain and unpredictable environment of real practice. Epstein and Hundert (2002) propose many components underlying professional competence that are difficult to assess, such as emotional awareness, curiosity and team-working. To attempt to evaluate such complex behavioural indicators requires multiple and lengthy OSCEs or in situ observations (Wass *et al.*, 2001).

### **Formative development and feedback**

OSCEs also have value for formative development, but the costly processes necessary to ensure validity and reliability can be prohibitive. Peer role play can be a more feasible solution for formative development and has been found to be as effective as using simulated patients (Bosse *et al.*, 2010). In both cases there is a requirement for the 'patient' role to be clearly guided in order that validity and reliability are maintained. For the learning event to be complete and the learning opportunity to be maximised, feedback about performance needs to be transmitted to the learner.

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Feedback informs about the difference or discrepancy between what is understood or demonstrated (current position) with what is aimed to be understood or demonstrated (goal) (Sadler, 1989). For this feedback to have the best chance of being accepted and to positively influence practice, it needs to be appropriately delivered and accurate. Many models for the effective giving of feedback have been proposed. Sadler suggested that three conditions needed to be present for a student to benefit from feedback: that they know what good performance is (i.e. the gold standard); that they are clear about how their performance relates to this gold standard; and that they know what they need to do to move from their current level of performance towards the gold standard goal. Nicol and Macfarlane-Dick (2006) refine Sadler's model (of three) and add four factors of their own to give their 'seven principles of good feedback practice'; they add: the facilitation of reflection in learning; encouraging dialogue between student and teacher about learning; encouraging positive beliefs and self-esteem and providing information to teachers that can shape future teaching. Another simple model for effective giving of feedback that has been proposed is according to the acronym, STOP (Specific, Timely, Objective and on Observed behaviours and Plan for improvement): this acknowledges that feedback should happen as soon as possible after an observed event and be an informed, non-subjective description of performance that relates to behaviours that can be changed (Lipnevich & Smith, 2009; Gigante *et al.*, 2011). All models rely on a degree of communication expertise by the person giving the feedback and on the alignment of the uptake and decoding of the message by the recipient with the message that was intended. Hattie and Timperley (2007) acknowledge the importance of feedback to learning and that giving and accepting feedback requires skill by both teachers and students and that the mere act of providing feedback is only part of the equation. Nicol and Macfarlane-Dick, warn that the giving and receiving of feedback can polarise student and teacher, placing formative assessment in the domain of the teacher and restricting ownership, empowerment and self-regulation by the student. Whereas, combining self-evaluation with effective feedback can maximise a learning experience. Nicol and Macfarlane-Dick also describe how formative evaluation and feedback are integral to enabling and empowering students to become self-regulated learners.

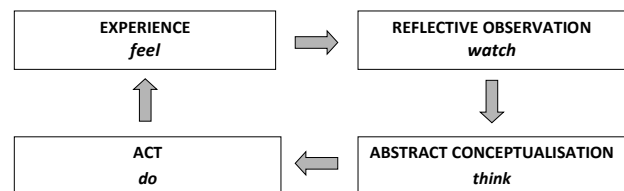
Self-regulated learning was described by Pintrich (2000) as the process whereby learners plan, construct, monitor, regulate and reflect on their individual learning and work towards their defined goals. Rather than acquiring knowledge through passive means (on the tutor's agenda), the self-regulated learner is self-motivated and proactive in their knowledge and skill acquisition to construct and direct learning according to what is needed to achieve individual goals.

### Experiential learning

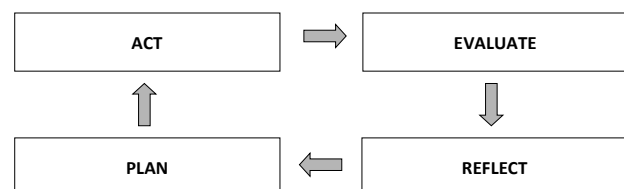
Kolb (1984) defined learning as, "the process whereby knowledge is created through the transformation of

experience," and this describes his experiential learning theory. He proposed that any individual tends to have a preference for learning through concrete experience (feeling) or abstract conceptualisation (thinking) and by reflective observation (watching) or active experimentation (doing) and suggests a cyclical process for the acquisition of knowledge (Figure 1a). This model implies that any individual student will have their own learning preference and will learn at each of the four stages of Kolb's experiential learning cycle to a greater or lesser extent. The reflective learning cycle (Figure 1b), adopted by the General Pharmaceutical Council (GPhC, 2011) to guide continuing professional development (CPD), is an adaptation of Kolb's, and places reflection as central to learning.

**Figure 1a: Kolb's 4 stage experiential learning cycle (Kolb, 1984)**



**Figure 1b: Reflective learning cycle for continuing professional development (CPD) (GPhC, 2011)**



When constructing a learning event or learning series for any group of learners, it would seem desirable to incorporate each stage of the reflective and experiential learning cycles into the design to maximise accessibility and learning for any individual, irrespective of their learning preference. The iSED<sup>®</sup> web-based learning tool has been developed with the afore-mentioned learning theories and feedback models in mind.

iSED<sup>®</sup> captures and offers feedback online about performance compared to a pre-written, inbuilt gold standard, after the real time or video observation of a role play interaction and data entry to iSED<sup>®</sup>. The program is applicable to many situations requiring objective evaluation of the application of knowledge and skills in practice and simulated practice.

A gold standard of behavioural indicators that demonstrate (for this study): communication skills, information retrieval skills, recommendation (and counselling skills) and follow up advice, for a particular

scenario, is written into iSED®. A carefully scripted patient brief and story/history is written alongside this. In the context of this study, students adopt the role of 'pharmacist' in a videoed OSCE-style role play with real or staff actors or fellow students.

The student views his/her own videoed performance immediately after role play and answers objective, criterion referenced questions about this observation. These questions are answered directly on to the iSED® program.

Following data entry, iSED® generates instant, permanent feedback on performance compared to the gold standard, confidentially accessible to the individual student (and tutor). Students decide when and where to retrieve this feedback and in what detail to engage with it. Feedback is in two levels: first a colour-coded (red, amber, green) indication of competence in each of the four areas: communication skills, information retrieval, the recommendation, follow-up advice; and second, contextualised detailed feedback on each underpinning behavioural indicator of competence within each of these four areas. The program gives: a green indicator of competence where a student has observed more than 70% of the behavioural indicators within a given area (e.g. communication skills); amber where 40-70% have been observed and red where less than 40% are observed. The students' aim is to achieve green in each of the four areas. Students are able to expand each area of feedback to view the specific behavioural indicators that they were measured against. It is possible to assign an 'instant fail' weighting to individual behavioural indicators which will override the percentages that govern the 'traffic light' colour indicators described.

Where a student neglects to demonstrate a given behavioural indicator, he/she can view the contextualised feedback relating to this specific indicator of competence. Students are invited to engage with suggested online learning resources and link directly to their URLs, giving opportunity to make-up that specific shortfall and so completing the experiential and reflective learning cycles (Figure 1a and 1b).

Where a behavioural indicator is demonstrated, this is shown and ticked and no further action is required, so enabling targeted learning for the individual. Figures 2a and 2b show screen shots from the iSED® program, giving examples of the two levels of feedback given against the criterion referenced questions. The 'gold standards' and 'reference criteria' were developed by an academic team in a similar way that a clinical assessment OSCE is developed using a 'blueprinting process' (Austin *et al.*, 2003).

This process seeks to enhance students' understanding of their current skills and learning needs, and facilitate a self-regulated learning approach, with a view to becoming competent, self-regulated practitioners.

The rationale for the present study is conceived in the context of developing competencies of pharmacy students in responding to symptoms. The model for competence development and the iSED® innovation is in line with the

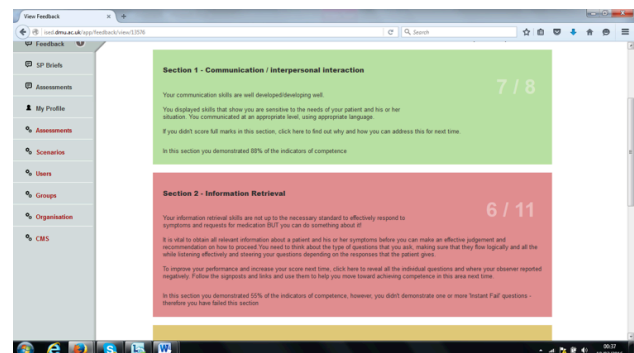
increased emphasis on a competence-based UK MPharm and enables students to demonstrate their knowledge and skills, operating at the 'shows how' level of Miller's triangle (Miller, 1990). Carefully guided peer or staff (simulated) patient role play along with iSED® and video self-observation are used to generate individualised feedback on performance and to support and guide student self-regulation and self-development towards increased competence. Student perceptions of iSED® as a formative self-regulating learning tool are investigated.

This research aims to contribute to the literature in professional and vocational learning, to enhance competence-based education and improve the learning environment for simulated pharmacy activities.

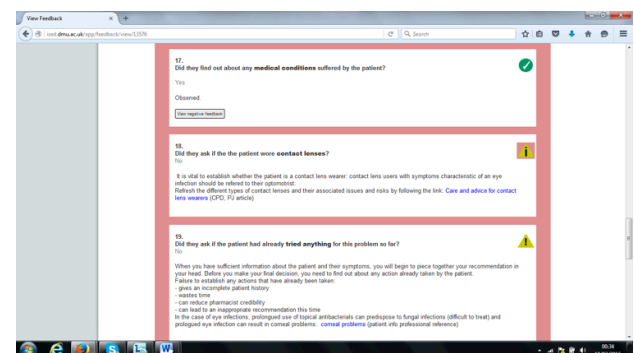
The objectives of the study were:

1. To determine the views of students on their experience of iSED® in evaluating and understanding their own performance in a responding to symptoms scenario
2. To understand how students perceive their own learning in relation to the use of iSED® when responding to symptoms in a simulated practice environment.

**Figure 2a: Screenshots from the iSED program - First level of colour-coded feedback**



**Figure 2b: Screenshots from the iSED® program - Contextualised feedback on each underpinning behavioural indicator of competence (with signposting and URL links where appropriate)**



## Methods

Fieldwork was conducted through questionnaires and focus groups drawn from pharmacy students at Leicester School of Pharmacy between January and April, 2014. Data collection was a two stage process.

**Stage 1** was a retrospective questionnaire study of Year 2 pharmacy students who, in their first year, were the first cohort to use iSED® in practical workshops. Questions aimed to reveal perceptions of iSED® and were posed as statements with a five-point Likert scale to select degree of agreement from, 'strongly agree', 'agree', 'unsure', 'disagree' and 'strongly disagree'. Statements were both negatively and positively phrased with positively phrased statements scored as: 'strongly disagree'=1, 'disagree'=2, 'unsure'=3, 'agree'=4 and 'strongly agree'=5. Negatively phrased statements were assigned reverse scores of 'strongly disagree'=5, 'disagree'=4, 'unsure'=3, 'agree'=2 and 'strongly agree'=1.

Means were calculated to indicate the extent that the students were favourable towards iSED®: a mean score of greater than 3 indicates a positive view. The questionnaire included an option for any respondent to register interest in taking part in a focus group.

**Stage 2** included focus groups with seven volunteer Year 2 students and separately with 30 volunteer Year 3 students, subdivided into four smaller groups of eight or seven students. The Year 3 cohort had no experience of iSED®, allowing comparison of iSED® as a performance enhancement tool within the curriculum. Year 3 (iSED® naive) students were therefore invited to attend a single responding to symptoms iSED® enhancement workshop. The 30 Year 3 students took part in this workshop before being subdivided for the focus group discussions.

The study was approved by De Montfort University, Faculty of Health and Life Sciences Research Ethics Committee.

### *iSED® enhancement workshop (Year 3 iSED® naive students)*

This workshop comprised: pre-workshop self-directed revision about the eye and conjunctivitis; a presentation on the use of iSED®; videoed role play with Year 4 researcher students as 'patient' (adopting a given patient role and following a script linked to the iSED® scenario) for the Year 3 student 'pharmacists'; student self-observation of their own videoed role play and concurrent data input direct to the iSED® program. The scenario related to an enquiry about 'red eyes'.

After role play, watching his/her video and data entry, each student logged in to iSED® to access their performance feedback. The students could reveal the detail of where they met and fell short against each behavioural indicator within a given area. This enabled students to follow signposting links directly to online learning resources to top up their learning for identified shortfalls.

After the workshop, focus group discussions were convened for 30 minutes and were audio recorded and transcribed verbatim. Transcriptions were used as the basis for a qualitative, thematic, framework analysis to evaluate student perceptions of their learning and engagement with iSED®.

## Results

Table I shows questionnaire results from 108 (82% return) Year 2 respondents and calculated means for each statement to indicate favourability towards iSED®. All mean values were greater than three, indicating a general positive perception and attitude towards iSED®.

Thematic analysis of the transcripts from the Year 2 and 3 focus groups revealed three broad emergent themes: the visualisation and nature of feedback; self-regulation and cyclical learning; seeing yourself as others see you (Table II).

Mean scores relating to feedback tended to be the highest scoring of the questionnaire. The highest mean score was 4.19 for the questionnaire statement, 'immediate feedback provided by iSED® is a crucial part of the learning experience'. The majority of students agreed or strongly agreed with this statement, indicating their preference for feedback close to the event. Focus group conversations endorsed this and included comments about being able to relate to feedback having just lived the event (Table II, Visualisation and nature of feedback). A mean score of 4.01 for the questionnaire statement, 'the personalised feedback given by iSED® supports the learning needs of individuals,' was also borne out in the focus group discussions where students described the descriptive nature of feedback, specific to the scenario and them as individuals, helpful, as opposed to more generalised statements relating to performance.

Focus group discussions were also positive about the use of colour-coding and visualisation of performance (this was not investigated in the questionnaire) and how this endorsed both positive and negative aspects of their behaviour. Students also liked the permanence of feedback and being able to compare performance between scenarios and track progress.

The lowest mean score of the questionnaire was 3.29 for the statement 'iSED® tends to prevent the observer from using professional judgement when assessing the response to symptoms'. Thirty nine percent were 'unsure' of their response to this statement and this point is discussed later

Mean scores for questionnaire statements relating to the influence of iSED® in developing professional competence reflected an overall positive prevailing opinion of iSED® and this was endorsed by some students in the focus groups who felt that iSED® helps them prepare for interactions with real patients.

**Table I: Year 2 student questionnaire responses in relation to feedback, influence on competence and practical issues associated with iSED®**

Area/Questionnaire Statement	Strongly Disagree (%)	Disagree (%)	Unsure (%)	Agree (%)	Strongly Agree (%)	Mean score towards iSED
<b>Feedback</b>						
It is unrealistic to view all the feedback material provided by iSED®. (n=107)	19 (17.8)	51 (47.7)	24 (22.4)	11 (10.3)	2 (1.9)	3.69
The immediate feedback provided by iSED® is a crucial part of the learning experience. (n=108)	0 (0.0)	5 (4.6)	8 (7.4)	56 (51.9)	39 (36.1)	4.19
The immediate feedback given by iSED® greatly enhances learning. (n=106)	1 (0.9)	5 (4.7)	7 (6.6)	65 (61.3)	28 (26.4)	4.08
The personalised feedback given by iSED® supports the learning needs of individuals. (n=106)	2 (1.9)	5 (4.7)	5 (4.7)	72 (67.9)	22 (20.8)	4.01
<b>Influence of iSED® on competence</b>						
The development activities offered by iSED® help to enhance skills when responding to symptoms. (n=108)	0 (0.0)	6 (5.6)	14 (13.0)	72 (66.7)	16 (14.8)	3.91
Experience of using iSED® probably will not make any difference to the practical assessment score in PHAR1605. (n=106)	25 (23.6)	53 (50.0)	12 (11.3)	14 (13.2)	2 (1.9)	3.80
I cannot see how iSED® will enhance professional competencies. (n=106)	26 (24.5)	66 (62.3)	8 (7.5)	4 (3.8)	2 (1.9)	4.04
iSED® helps to improve confidence when responding to symptoms. (n=105)	1 (1.0)	8 (7.6)	9 (8.6)	72 (68.6)	15 (14.3)	3.88
<b>Practical issues of iSED®</b>						
iSED® tends to prevent the observer from using professional judgement when assessing the response to symptoms. (n=108)	6 (5.6)	41 (38.0)	42 (38.9)	16 (14.8)	3 (2.8)	3.29
iSED® is intuitively easy to use. (n=108)	3 (2.8)	4 (3.7)	8 (7.4)	76 (70.4)	17 (15.7)	3.93
Video recordings are not a good way to assess responding to symptoms role play. (n=106)	22 (20.8)	47 (44.3)	21 (19.8)	14 (13.2)	2 (1.9)	3.69

Values may exceed 100% due to rounding

Note: shaded rows indicate reverse scoring for negatively phased questions, from 'strongly disagree = 5 to strongly agree =1

**Table II: Emergent focus group themes and associated examples of quotations associated with student learning using iSED®**

<p><b>Visualisation and nature of feedback</b></p> <p>“The colours as well; the green and red. It sticks in your head and I can still remember what I got wrong when I got that red.”</p> <p>“I think it shows the smallest mistake could make such a big difference, even though you’ve done so many right things, the smallest thing you could miss out could be really important”</p> <p>“I think positive reinforcement is the best way to learn so if you keep getting knocked down you’re never going to learn... but with this you can always see well actually I got that right ... so you got the green section....”</p> <p>“... because it’s fresh in your head isn’t it?’ What you have done and what you haven’t...”</p> <p>“... you get immediate feedback and you know exactly where you’ve gone wrong and how to improve yourself.”</p> <p>“It’s more like personalised... because you’re improving on the areas that you need to improve on and not worrying about other people’s weaknesses ... because normally the feedback is generalised to the whole class ....”</p> <p>“...I think it’s good because I remember reading through the list and I think I forgot to ask one of the key questions and I remembered when it came up next time...”</p> <p>“... if someone’s speaking to me I’ll remember certain things but then I’ll forget most of the conversation, there it’s just like there’s a record of it where you can read it slowly in your own time</p>	<p><b>Self-regulation and cyclical learning</b></p> <p>“Developing something through time, it doesn’t just come off a textbook. Or it doesn’t come with just doing something once, it comes with time and practise, and I think that kind of relates a lot to pharmacy...”</p> <p>“Because you can always keep looking back and seeing it again and again...”</p> <p>“The thing I liked about it is that if you make a mistake it directs you to where to look for the information... I think that is really useful.”</p> <p>“Based on our feedback of the first scenario we could see how much we have improved just by doing another scenario....”</p> <p>“Kind of like ... they’ve put us out on a boat and said ... ‘go and learn for yourself.’”</p> <p><b>Seeing yourself as others see you</b></p> <p>“It’s really helpful to see what you did yourselves and then you can judge yourself. Other people might not want to tell you because they think they are offending you but if you see yourself...”</p> <p>“It does make a difference, because no matter how much the examiner describes you and how you were, until you see for yourself...that’s reality really”</p> <p>“It’s funny because you can see yourself actually getting stressed or something ... in mine, my voice pitch changed, which is quite surprising”</p> <p>“I thought I was confident and smiling but I wasn’t at all!”</p> <p>“Yes being able to watch yourself from someone else’s perspective is really useful...”</p>
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One clear emergent theme (Table II, Seeing yourself as others see you) from the focus groups was the students' perceived benefits of self-observation using video and they articulated how this helped them appreciate the reality of their performance.

A number of additional points were proposed for improvement to the program. These points related to: being able to view the contextualised feedback even if they met a particular behavioural indicator (they were only shown this feedback if they fell short); having the opportunity to add their own self-reflection to be held alongside the objective feedback held on their profile for each scenario and having multiple scenarios on the program that they could use at home. They discussed the relative merits of peer and self and tutor assessment against the iSED<sup>®</sup> criteria and felt that there were potential benefits and drawbacks associated with each of these. Students were unaware that, for a given videoed role play, it was possible for multiple data entries to iSED<sup>®</sup> and that this would allow more than one perspective on the performance to be compared. There was also a comment that some students felt input from a tutor was valuable where it was specific to the individual student and would not like to see this replaced.

## Discussion

Students from both cohorts highlighted the feedback as a major contributor to learning and preferred detailed descriptive statements given by iSED<sup>®</sup> to evaluative statements associated with a traditional OSCE performance standard and general tutor feedback that is often given in tutorials. This concurs with Lipnevich and Smith (2009), that descriptive feedback is the most effective form of feedback, and also that verbal feedback given by a tutor is not necessarily decoded and received as it is intended (Nicol & Macfarlane-Dick, 2006). Statements relating to the iSED<sup>®</sup> feedback were high mean scoring statements in the questionnaire. Further, in focus group discussions, students were positive about feedback being specific and unbiased and appreciated positive reinforcement of what they were doing right as well as it being clear where they were falling short. This aligns with findings of Weaver (2006) where students identified feedback as being unhelpful when comments were non-specific, lacked guidance, were negatively focused and unrelated to assessment criteria. These four findings of Weaver are addressed within the iSED<sup>®</sup> concept.

Students felt that the timing of feedback close to the event was important to their learning and self-regulation. The iSED<sup>®</sup> model makes feedback available from the point of data entry (and submission) and this is something that the students preferred. Whether this early (immediate) feedback has a positive or negative effect on long-term retention and learning is unknown. The intention with iSED<sup>®</sup> is that, by making feedback available immediately (after observation and data entry) and also permanent, the benefits associated with both immediate feedback (fresh

and with the event clearly in mind) and delayed feedback (after opportunity for reflection) are possible. A number of studies have looked at the timing of feedback, and benefits have been seen when feedback is given immediately and also when it is delayed, and that this appears to vary according to the task (Hattie & Timperley, 2007). However, the immediate feedback referred to in many studies tends to relate to interruption of the task to correct errors as they happen, whereas immediate feedback described in this context refers to feedback offered immediately after observation and completion of the event.

There were positive comments about the colour-coding of feedback (as an indicator of competence), and that this visualisation of performance helped the students understand and remember strengths and weaknesses. The iSED<sup>®</sup> process relies heavily on what could be described as 'self-regulated learning' (Pintrich, 2000) in that: students prepare for the role play; view and reflect on their performance; answer questions about their performance compared to a gold standard; actively retrieve feedback and make decisions on which learning activities to pursue to make up identified shortfalls. Feedback (colour-coded and detailed contextualised) from all role plays for the individual student are held securely under personal login, allowing comparison of performance over time and progress monitoring by the student him or herself, so giving over responsibility and means for setting and adjusting personal performance targets. This may have impact on student motivation (though this has not been investigated here) and motivation and the ability to self-motivate is an important factor in effective self-regulated learning (Pintrich, 2004). This permanence of detailed feedback and being able to track progress was brought out positively and clearly in focus group discussions.

One of the seven principles of good feedback practice proposed by Nicol and Macfarlane-Dick, 2006, is that feedback should inform teaching. Although iSED<sup>®</sup> feedback is confidential, the tutor can view all his or her students' feedback as a group on the iSED<sup>®</sup> program for a given scenario. The program enables a particular section (e.g. information retrieval) for that population of students to be examined and compared, and performance of the group at the level of behavioural indicators to be scrutinised. iSED<sup>®</sup> will highlight if students are tending to fall short on a particular area (behavioural indicator) and this information can be used to inform specific areas for future teaching emphasis.

Some Year 2 students revealed in the focus group that they did not always use the development links offered by iSED<sup>®</sup>. The reason for this was not clear, for example, whether they did not find the links, or had not had the process explained fully, or made an active decision not to follow them or use them, is not known and a point for future investigation. This may link to the questionnaire statement, 'it is unrealistic to view all the feedback material provided by iSED<sup>®</sup>,' where the mean score towards iSED<sup>®</sup> was 3.69. This indicates that most students tended to think it was not unrealistic to view all

the feedback provided by iSED®, however 35% were either unsure or agreed with the statement. iSED® offers detailed feedback (with signposting) on all the behavioural indicator shortfalls, but the student can decide to engage with this to a greater or lesser extent and choose to focus on selected key areas for their personal development. This selective engagement is reasonable and in line with self-regulated learning principles and needs to be communicated to the students (and staff). iSED® offers feedback and learning resources to the individual, but the student can decide to retrieve some of it or all of it and the extent to which they engage with it.

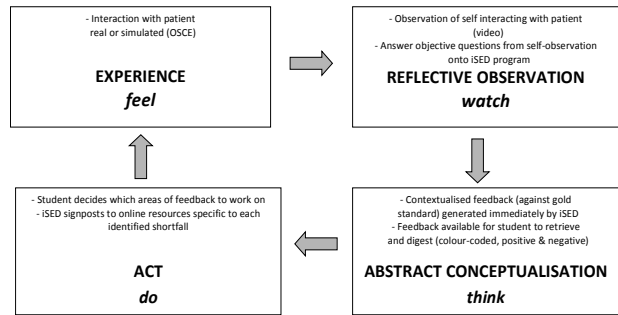
The lowest mean score related to the questionnaire statement, ‘iSED® tends to prevent the observer from using professional judgement when assessing the response to symptoms’. This may be seen as either positive or negative towards iSED®. The iSED® program has been developed with a view to removing subjectivity and individual judgement from the ‘scoring’ (data entry) process to ensure feedback is accurate and unbiased. This enables non-experts (non-expert academic and technical staff, students themselves in self and peer-observation) to observe and enter data to iSED®. An ideal situation (for summative assessments in particular), is that every student is subject to exactly the same experience, the same patient and assessor and that their assessor/patient is not known to them and reports accurately and without personal interpretation and bias. However, with large numbers of MPharm students in any given cohort, this is often unrealistic. It has been found that familiarity of assessor with candidates is a significant source of bias when assessing performance in OSCEs (Stroud *et al.*, 2011). Endorsing this finding, the focus groups revealed the negative views of students on the issue of subjective marking within traditional role play exercises and assessor variation. Further, to enable students themselves to ‘score’ each other and themselves on performance, it is important that behavioural indicators for a given scenario are predetermined, clearly phrased, do not require expert judgement and are objective. iSED® intends to minimise subjectivity by asking ‘yes’/‘no’ format questions based purely on observation rather than interpretation. It places responsibility for accurate data entry, based on self-observation, in the hands of the individual students (in this case) themselves. A comparison study of different observers viewing and ‘scoring’ the same patient pharmacist interaction using iSED® would be of interest to gain a clearer view of objectivity, and is a point for future study.

The professional judgement about which specific behaviours should be displayed for a given scenario, what questions must be asked and what recommendation/s are appropriate, is applied at the writing stage of the data collection questions on the iSED® program through consensus with two or more expert practitioners.

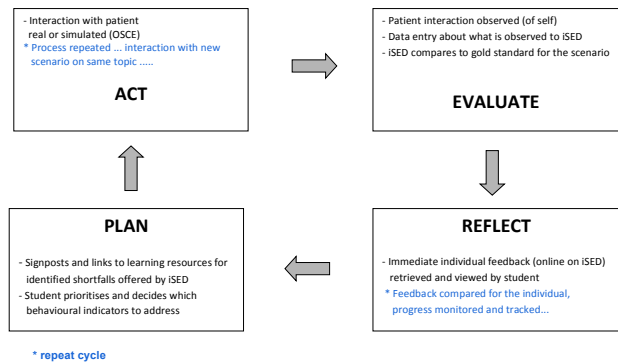
An aim of iSED® is for students’ learning to relate to Kolb’s experiential learning cycle (Kolb, 1984) and also the reflective learning cycle associated with CPD and adopted by the GPhC (2011) (Figures 3a and 3b). Through active reflection and proposed learning activities, iSED® was designed to enable students to

translate concrete experience from practical interaction into learning that empowers them to handle future challenges within similar areas of practice or simulated practice.

**Figure 3a: Alignment of iSED® with Kolb’s four-stage learning cycle**



**Figure 3b: Alignment of iSED® with a reflective learning cycle**



Findings from this study endorse previous suggestions that direct observation of an event, in comparison to traditional learning, enhances student motivation and improves levels of understanding gained (Figueira & Rocha, 2014). Students commented, for example, that their perception of how they had performed was often inconsistent with the reality when they watched the video. Students realised the value of seeing themselves and felt this had greater impact than being told about their performance by a third party and that they learnt things about themselves that they would not otherwise have done or accepted. This may imply that this guided self-observation as employed here, would improve learning.

There are several salient advantages to learning by experience and by a self-directed approach, such as increased student motivation and the removal of student-teacher polarisation (Wheatley, 1995). This approach puts the learner at the centre of their learning experience, encourages active reflection and integrates theory and practice, all of which strongly relate to Biggs’ theory of ‘constructive alignment’ (Biggs, 1996). The use of iSED®

can be linked to this constructive alignment model where the student, as end-user, constructs their learning through choice and engagement with relevant learning activities. However, the potential to learn from cyclical self-evaluation and the students' role in self-regulating learning needs to be clearly communicated to students (and staff), as some students were unsure of their ownership of the process.

Assessing professionalism using iSED® and OSCEs, particularly for summative assessment, is challenging. Coles (2002) describes professionalism as being able to engage in complex and unpredictable tasks on behalf of society and using individual discretion to decide what is 'best' in a situation rather than what is 'right' in an absolute sense. Professionalism is closely related to uncertainty and involves applying knowledge and being challenged in unfamiliar and unpredictable areas and this presents real difficulties for computer aided learning technologies and indeed OSCEs in general.

One of the areas suggested for iSED® improvement was for students to be able to access the detailed feedback for a given behavioural indicator when they met as well as fell short of it – this facility has now been built in to the program. This means that if a student wants to view the contextualised feedback and learning links for a behavioural indicator that they met, they are now able to 'click' to reveal this.

## Conclusion

The students found iSED® an easy to use and effective evaluation and learning tool to enable valid and feasible formative OSCE evaluation. They perceived it as having the potential to enhance performance and competence. The iSED® experience was popular with both experienced users and students new to the iSED® learning process. Positive aspects relating to the immediate, descriptive and permanent nature of feedback and the visualisation of feedback, aided by colour-coding and symbols, featured strongly.

Students appreciated that they could return to feedback and compare and track their individual performance and improvement within their own secure dashboard. It is felt that this has potential to enhance students' motivation and enable them to identify and target specific shortfalls and define and redefine goals, all of which contribute to the self-regulating learning process which is vital to the success of the emergent graduate and future pharmacist. However the students' ownership of the process and the opportunity to use iSED® as a personal learning and development tool needs to be more clearly communicated to both students and staff.

Use of video to enable students to view their performance and answer iSED® questions to compare what they observe to what is desirable, according to a pre-defined gold standard, was recognised as a valuable part of the process. Many students were surprised by what they saw and felt that this learning would not have been achieved by feedback from another individual. Guided critical self-

observation can also support self-regulated learning processes.

A key outcome of this research is that iSED® supports students' skill development through self-observation and understanding of individual identity as a learner. This finding is linked to the alignment of iSED® with experiential and reflective learning cycles, where the student actively and selectively engages with personalised feedback in order to constructively correlate learning towards the standards required for future practice.

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