Title: A journey of undergraduate pharmacy Interprofessional Education: the learning for students and educationalists

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ABSTRACT

Objective. To describe the Interprofessional Education (IPE) provision to a Level 1 undergraduate Pharmacy cohort and evaluate the student experience towards developing knowledge, attitudes and behaviours for collaborative practice.

Methods. A mixed methods strategy was employed to detect student self-reported change in knowledge, attitudes and behaviours. Validated tools were used to assess student perception and attitudes. The Nominal Group Technique (NGT) was used to capture student reflections and provide peer discussion on the individual IPE sessions.

Results. The validated tools did not detect any change in student attitudes and perceptions. The NGT succeeded in providing a milieu for participating students to reflect on their IPE experiences. The peer review component by this process, facilitated students to compare their initial perceptions and reactions and renew their reflections on the learning experience

Conclusions. The NGT process offered educationalists the opportunity to appreciate the student experience through the reflective process that was enriched via peer discussion.

INTRODUCTION

Enhanced coordination of healthcare practitioners through interdisciplinary collaboration demonstrates patient benefit by preventing fragmentation of care.[1,2] Interprofessional teams improve the quality of patient care,[3,4] with lower costs,[4,5] and decreased length of hospital stay.[6] Interprofessional education (IPE) defined as '*education expressly intended to promote the effective function of a health team involving the relevant health professions*',[7,8] has received much focus globally as a means to achieve this collaborative practice. The Centre of Advancement of Interprofessional Education (CAIPE) highlights that IPE as '*occasions when two or more professions learn with, from and about each other to improve collaboration and quality of care*'.[9]

IPE can take many guises, some of which may not be as effective as others in cultivating collaborative practice.[10] Certain fundamental conditions have been claimed to be crucial for the success of IPE in achieving positive attitude change at the undergraduate level. The "contact hypothesis" outlines prerequisites of a physically and emotionally comfortable learning environment, such as: ensuring the setting and participants are positive and co-operative; there is institutional support with successful joint working; members of the group are representative and typical, and of equal status and there should be positive feedback to students.[11]

In the development and evaluation of IPE initiatives there are 2 learning theories that can be applied, namely the behaviourist and constructivist approaches. Hean et al[12] delineate how behaviourists focus more on the outcomes of learning expressed as behaviours. This theory has been largely excluded from literature describing IPE curriculum design.[12] However, the Kirkpatrick model[13] of evaluation of learning outcomes adapted by Barr et al[14] (Kirkpatrick/Barr model) (Table 1), which is behaviourist in approach, has been used to measure effectiveness of IPE programmes.[15,16]

The measurement of change in student behaviour within interprofessional working (Level 3 of the model shown in Table 1) is an example of a behaviourist approach to evaluation. This has traditionally been hard to identify and measure especially at the undergraduate stage[12] except through the method of self-reporting by the student.[15,17] More advanced levels of this outcome framework such as change in organisational practice (Level 4a) and benefits to patients (Level 4b) are problematic to measure pre-qualification and require longitudinal evaluation.[18] Constructivists focus on the process of learning, or constructing knowledge, and encompass a range of further theories classed under 2 categories, cognitive and social constructivism. Hean et al highlights that the use of various theories within currently published IPE literature has created an '*un-navigable quagmire*' and recommends that future researchers should apply theories to soundly and robustly underpin practice, both in the design of IPE within curricula and its subsequent evaluation.[12] Other

researchers agree that the lack of appropriate research around the effectiveness of IPE should be addressed through the application of more rigorous evaluative methods to comprehend the potential impact of IPE on professional practice and health outcomes.[2,14] Walsh et al recognise it is the methodological difficulties that have limited generating this evidence thus far.[19]

Members of CAIPE issued a report that extensively reviewed IPE evaluations, and suggested the need to use a range of methodologies in the investigation of interventions to strike a balance between evaluation of process and of outcome. Authors of this report also suggested qualitative techniques for the former and quantitative means for the latter. It was acknowledged that a scarcity of data existed to show how long changes in attitude or knowledge had been sustained and how learning applied to practice post-IPE.[10]

We have recognised the need to both evaluate the effectiveness of our own IPE strategy and to contribute to the growing IPE evidence base. In doing so, we describe our IPE initiatives by means of the learning theory that underpins them and categorise the expected learning outcomes using Levels 1-3 of Kirkpatrick/Barr model (Table 1).

DESIGN OF IPE

Educational model for IPE

IPE is delivered as a strand throughout the Durham 4-year Masters of Pharmacy (MPharm) curriculum which is effectively described by Husband et al.[20] For the first 2 years of both the medicine and pharmacy undergraduate programmes students are co-located on the same campus. IPE commences within the second week of both programmes, at a time when serendipitous and informal interprofessional encounters have been experienced between new and returning medical and pharmacy students. Our curriculum developers have followed a strategy, as has been reported elsewhere,[21] that IPE should occur at the earliest opportunities in undergraduate education and work-based training to avoid the development of negative stereotypes and a preference for

uniprofessional working over multiprofessional practice. This approach is in contrary to Areskog[22,23] and Pirrie et al,[24] who believe that IPE should be introduced when students have a clear comprehension of their professional roles. Four to 5 sessions each academic year exist within the current structure, where interprofessional working is revisited with increasing levels of sophistication and complexity as the student progresses, as aligned to the concept of the spiral curriculum.[20] In designing the IPE sessions it is acknowledged that there is no ideal or essential location for IPE within the curriculum, rather there are many opportunities for enhancing learning through IPE. Currently sessions in Level 1 (year 1) are mainly biprofessional including students from the undergraduate medicine programme, with one session also including nursing practitioners. In subsequent Levels students from other programmes include social care, education (both from the same institution) and nurses (from a neighbouring institution) join the pharmacy students.

Description of each of the IPE sessions as educational interventions

Level 1 of the pharmacy programme hosts 4 IPE sessions, the descriptions of which, and associated aims and the expected pedagogical outcomes categorised using the Kirkpatrick/Barr model are summarised in Table 2.

Further to this, logic diagrams,[25] Appendices 1-4, have been constructed to give a picture of how each session works and link outcomes with the session activities and processes and the theoretical assumptions, which underpin them. Logic models have been found to facilitate thinking, planning and communication about intervention objectives and accomplishments, and have been adopted here for the clear description of each IPE session as an educational intervention.[25]

EVALUATION

Study aims and design

Our mixed methods approach was employed to explore the students' learning experience and outcomes, and the context in which learning occurs. We aimed to evaluate the IPE strategy within Level 1 and comprehend how implementation, causal mechanisms and contextual factors shape learning and result in the outcomes experienced by students.

Semi-quantitative and qualitative method

The Nominal Group Technique (NGT) is an evaluative methodology[33] described as 'semi quantitative and qualitative' in which responses from participants are based on a single topic. NGT, initially developed for market research, has been employed in addressing potentially complex qualitative concepts and has become useful in examining education, policy and research. The methodology requires direct participant involvement, (in a small group setting) in a way that is non-hierarchical, and where all participants have an equal voice and all responses to the topic have equal validity.[34] The steps with NGT are as depicted in Figure 1.

NGT sessions were held after the second (IPE Game), third (Patient Safety) and fourth (SimMan®) IPE sessions. Students were briefed by the facilitator of the purpose of the discussion and were then asked to reflect on their most recent IPE experience, and in particular list negative and positive reactions within the silent reflection. Rich data obtained through this method allowed aspects of context, implementation of delivery and causal mechanisms to be explored from the student perspective. There has been debate as to what constitutes the optimal size of group for NGT, with suggestions generally ranging between 5-9.[34] At each NGT session up to 10 students were invited to ensure this quotient was met.

Quantitative methods

Student experience of IPE was measured quantitatively after each IPE session throughout the year using 2 validated tools for exploring students' self-assessment of their attitudes to collaborative learning and working.

The Readiness for Interprofessional Learning Scale (RIPLS)[35] and the 12-item adapted version of the 18-item Interdisciplinary Education Perception Scale (IEPS)[36] were utilized to detect changes in attitudes over time. These tools have been utilized in various studies for graduate[37] and undergraduate students[38-40] as well as the practicing professionals.[41]

Despite numerous studies it is still unclear which scale is superior for finding attitude differences among students in tested health professionals. The RIPLS was designed to assess novice students' own attitude toward interprofessional learning, while the IEPS assesses perceived attitudes about team collaboration for students' own profession. The IEPS may thus be appropriate for advanced or senior students once they have had greater exposure to members of their own profession.[42] However, due to the lack of empirical evidence to support this we employed both scales, but used the RIPLS at the earliest point, which was in the second week of the student's programme, where they can be considered novices, and the IEPS was added in at the second data collection point after students have had time to integrate with members (classmates, more advanced students, staff) of the same profession.

A further questionnaire was constructed using the accumulated statements from each of the 3 NGT sessions. Statements were listed and accompanied with a 5-point Likert scale to measure level of agreement and students were asked to rate their response to each statement in relation to each of the 4 IPE sessions they had experienced.

Ethics

Ethical approval for the study was granted by the School of Medicine, Pharmacy and Health Ethics Sub-Committee within the Durham University to survey students through pre- and post-session

questionnaires and via partaking in nominal group discussions (Ethics Application ESC2/2014/18). All students were provided with participant information leaflets and asked to provide written informed consent to participate within the study.

Data collection

The studied cohort were the Level 1 undergraduate pharmacy students (n=81). RIPLS and IEPS questionnaires were administered to and collected from the whole cohort at the beginning of each of the facilitated sessions. For the NGT, an academic mentor (AP) from the Level 2 (year 2) pharmacy cohort approached students to invite them to participate in the studies. This was carried out on a convenience based sampling approach. Different students attended at each of the 3 data collection points. Again, the first NGT session took place after students had undertaken both the Anatomy lecture and the IPE game since the former only provided an opportunity for the 2 cohorts of students, pharmacy and medicine, to learn with one another rather than include any form of interaction. Subsequent NGT sessions took place after the Patient Safety session and the SimMan® session.

Data analysis

All data from questionnaires was input onto Microsoft Excel worksheets and were checked for completeness, partial completeness (some questions were omitted) was accepted and answers included for analysis and incomplete questionnaires were excluded. Not all 81 pharmacy students attended all 4 of the IPE sessions due to absence, endorsed or otherwise. Quantitative data from the 2 questionnaires (RIPLS and IEPS) were analyzed using basic descriptive statistics at baseline and post intervention across all 4 IPE sessions as was the final questionnaire. Responses to the statements over the various data collection time points were tested for statistical difference using the Chi-squared test, where statistical significance was considered when $P<0.05$.

Data resulting from the NGT sessions consisting of the positive and negative reflections of the IPE

experience ranked in order of importance by the participants, acts as a descriptive evaluation of the IPE session. The focused reflection that followed was transcribed verbatim from audio recordings by one researcher (AP) and checked for accuracy by another (HN). They were then analyzed individually by 2 researchers (HN and ZN) via 'Framework analysis' as described by Ritchie and Spencer.[43] Resultant themes were discussed between the 2 researchers (HN and ZN) for agreement and clarification and a third author was consulted to mediate any discrepancies (IO).

ANALYSIS

Quantitative methods

The response rates for the RIPLS, IEPS and final questionnaire were 81.4% (±3.4), 79.1% (±5.7) and 73.2% (±4.9) respectively from the total 81 students who were administered the questionnaire.

Responses for both RIPLS and IEPS were highly positive in all sub-sections (RIPLS consisting of: teamwork and collaboration; professional identity; and roles and responsibilities. IEPS consisting of: competency and autonomy; perceived need for cooperation, and perception of actual cooperation). Across all statements within both the RIPLS and IEPS the Chi-square analysis showed no statistical difference in responses compared to baseline responses, but also longitudinally throughout the academic year.

Qualitative methods

A different set of 5 students participated in each of the 3 NGT discussions. These students were those who presented themselves from the original 10 who were invited. All reflections from each NGT session were classified by level of outcome using Kirkpatrick/Barr model and also by their positive or negative connotation as displayed in Figure 2.

The 5 most important reflections as ranked by individuals within the NGT sessions have been identified and level of agreement with these statements in relation to the IPE session has been

investigated within the entire cohort from the final questionnaire that was administered (Table 3).

The findings from the nominal group discussions following on from the ranking of ideas are presented as themes based on the students' experiences of each of the IPE sessions. The themes identified inductively through the natural course of the discussion and featured in all 3 NGT sessions. One theme, which every student from each of the NGST discussions contributed to, related to the organization of the IPE session (which relates most closely to the behaviorist focus upon outcomes, namely Kirkpatrick/Barr model's Level 1 of outcome classification: leaner's reaction). Many of the following claims of the pharmacy students from the three NGT discussions (NGT1-3 between pharmacy students P1-15) are commonly reported in the evaluation of IPE delivery and are recognized as crucial factors for its success.

Not achieving an appropriate group mix to allow a heterogeneous learning environment:[57]

'…the board game there was interaction but the groups…well in my group…the groups arranged beforehand weren't really kept and people just sat where they wanted to be…So you kind of lost the interaction side with that…' NGT1 P1

External buy-in[58,59] which is also one of the prerequisites stated in the contact hypothesis to frame an environment conducive for interprofessional working:[11]

'…I've also found that a lot of pharmacists…telling me stories they're heard from their lecturers about problems they've had with consultants or doctors..' NGT1 P3

Poor relationship to real life work:[58,59]

'You're in a mock up ward environment, you have a patient there, and that's when you'll see the roles..of pharmacists and medics…and how our courses complement each other, as opposed to someone showing you a board game whereby we're all sitting round a table and just following a counter.' NGT1 P2

The level of skill of the facilitator:[58,60]

'No…she didn't really know what was happening…like she didn't really…pull the whole table together…and make us work together' NGT2 P7

Some students made comments on the organization and management of the sessions which enhanced their learning experience.

Good facilitation:

'The lecturer we had, she made us do like…games and stuff afterwards, to remember the positions and stuff like that, because not all the lecturers were probably the same, but we just got a good one' NGT2 P6

Good learning material:

'Yes, the cases were so good..it's really good to get you thinking, because I would never have thought a pharmacist would…ever get involved in something to do with that' NGT2 P8

Briefing at the beginning of the session:

'From doing a briefing, we felt as though we had to take it a lot more seriously' NGT3 P11

Four further principles were identified that relate to adult and experiential learning:

1. pPerceived relevance of the learning opportunity

Eleven of the fifteen students across the three NGT groups made comments that began to demonstrate reflection in how the information was relevant to their educational and professional progress:

'*I think it's because it's like…, in our future careers we're going to be working together so we might as well start learning together now. As in…when you're in a hospital if you're a doctor or a pharmacist, you have to know what the other person does…*' NGT1 P3

'*When I was doing the board game….we mostly said negative kind of things, … but now…I think if…I'd known beforehand that this is what it's going to be like, that everything's going to lead up to this, then I would have been a bit more happier in the other IPEs as well.*' NGT3 P12

The perceived relevance of an educational experience or opportunity is a powerful facilitator to engagement and learning.[50,51] Students related better to the sessions where they could envisage the applicability to their future role and profession.[52]

2. Perceived demands of the learning opportunity

A majority of the students (ten of the fifteen students across NGT1-3) also displayed how their perceptions of their learning environment and what was expected from them affected their learning experience. The first NGT discussion revealed that some negativity from students from other groups

towards the board game affected student motivation to attend and also engage:

'Yeah.. apparently some medics from the first session told the second lot that it wasn't worth going to, so none of the medics turned up whereas all…we all turned up because obviously we're expected to go to everything, but some of the medics didn't..' NGT1 P2

This statement demonstrates that the explicit message of attendance was clear to pharmacy students; however this was counteracted by the implicit messages from the disengagement and negativity of other students. Some of the students claimed that knowing the aims, objectives and learning outcomes of the sessions could have made their experience more valuable.

'I think maybe, having more like set tasks, and less of the self-directed learning…because it was kind of hard to gauge what you needed to know from it, because you kept moving on the game board I guess, …I think it was just hard to know what you were supposed to take from it' NGT2 P6

This and similar comments may indicate that the usage of an exploratory IPE game early on in the undergraduate curriculum, with little instruction was too much to expect from the students early in their development. Students suggested restructuring this session so as to enhance the learning potential:

'A bit like that 'Who Am I?' game..a description of their role, because then it would make people engage more rather than just like, reading about it on a card.' NGT2 P9

3. The self-concept of the learner

Students (nine of the fifteen across NGT1-3) reflected on the level of challenge that each IPE session posed and related that to aspects of their self-concept. Students wish to view themselves as competent, self-directed, appropriately self-evaluative and exercising choice;[51,53] any phenomenon that attacks this may produce resistance and rejection.

One student had a concern that material from the patient safety session was too advanced and detrimentally impacted the enjoyment of the session.

'I found that at some points it would have been beneficial to have some background knowledge' and

'We hadn't learnt anything specific about specific drugs, and we hadn't really done much on disease states' NGT2 P7

The learning gap between what students think they know and what they think they need to know can stimulate learning through revealing learning needs and motivating learners to close the gap. However, if that gap is too large the student's self-concept can be negatively affected and demotivation and dejection can result, which counteracts productive and engaged learning.[54,55]

Conversely, some students found where this disjuncture existed, particularly in the SimMan® session, they gained an appreciation of the extent and depth of knowledge they would one day be expected to possess. They valued this stark realization in knowledge differential towards gaining a better understanding of the role of a pharmacist and also in recognizing the journey of development they were travelling to achieve it.

'I think not knowing made you focus more on the little you did know, and maybe trying to build, or try and convey as much as you did to medics in there, because I think if we did know everything it would be easy to kind of reel that off and just hang around, but I suppose because we didn't, it was more of a …'OK, we don't know, but we're going to have a look now, is there anything else….it was kind of that approach that I think was good' NGT3 P13

4. Links to prior learning.

Lastly, most students (eight out of the 15 across NGT1-3) identified and appreciated where IPE sessions related to earlier experiences or learning within the curriculum. The foundations provided by the previous iteration should serve to support new learning, but also improve learners' approach to IPE where they feel more comfortable.[51,56]

'I think it would have been better earlier, because before I went on my placement I think it would have been nice to know that there was like 6 different types of nurses….it would probably have been beneficial' NGT1 P6

'It was the whole Renin-Angiotensin-system-y thing wasn't it? For like ACE-inhibitors, and like I hadn't looked at that since we did the lecture, so when we did the briefing after, I was like 'Oh yeah, I remember doing that'' NGT3 P15

DISCUSSION

The baseline data of this Level 1 cohort demonstrated a high level of preparedness and positivity towards undertaking IPE. This self-reported attitude and perception as assessed by the RIPLS and IEPS tools did not change significantly over the sequential IPE sessions throughout the academic

year. Researchers have acknowledged the self-reported nature of these 2 tools, which necessitates caution in interpreting their results, since they may not be representative of actual interprofessional learning attitudes within a healthcare setting.[44,45] Further studies have suggested that there may need to be a significant differential between levels of exposure to IPE for these tools to be sensitive enough to detect a change in perception and attitudes.[42,46] Lie et al conclude that no single scale may adequately record attitude change and multiple strategies including qualitative measures should be incorporated to best study attitudinal change. Nevertheless, the reported positive attitudes towards IPE here can be considered as the optimum foundation for student engagement and motivation for learning within the experience.[37]

The NGT discussions showed a shift from mixed responses to more positive comments through the progressive IPE sessions. Also, there were initial responses within the first session (NGT1) that related mostly to the organization of the IPE sessions and the learner's reaction, as they saw the leading academic and the environment very much influential in their learning experience. After subsequent IPE sessions responses became more sophisticated and began to relate to the higher levels of outcome on the Kirkpatrick/Barr model. This internalisation of knowledge, skills, attitudes and behaviours characteristic of the profession develop through a process of socialization and gaining experience in the practice setting. Students learn to become a member and practise utilizing aforementioned characteristics through partaking in communities of practice;[26] IPE sessions and clinical placements, through interaction with others of their own and related professions, offer opportunities for such learning. The pattern of more developed outcomes was also reflected in the ranked comments about the IPE sessions, where levels of outcomes reported became more sophisticated in nature relating more to the impact on attitudes, knowledge, skills and behaviours. The final questionnaire allowed the generalizability of these comments to be tested within the entire cohort (Table 3). The levels of agreement or strong agreement were generally high (>50%) across all the statements except comment 3 pertaining to the Patient Safety session: *We did not have enough background knowledge to tackle the tasks*. Only 35% of the cohort agreed with this experience, 22%

was undecided and 44% were in disagreement. This finding is likely to be due to the differences in academic ability/self-efficacy of the students, rather than the level of challenge of the tasks.

Students enter the pharmacy degree, on the most part, from a college or sixth form where teaching is traditionally didactic and directed by the educator. Higher education requires a shift towards more self-directed and learner motivated learning styles, which can be quite a difficult transition for some students to navigate and adjust to. The structure of the IPE sessions was designed to accommodate this transition since it commenced with an interactive lecture (Anatomy session). This involved transfer of knowledge from educator to student where students could then only be expected to be able to recall knowledge ('knows'), the lowest form of competence based on Miller's triangle.[47] Subsequent sessions were based around small group work where students become more self-directed, initially with an exploratory IPE game, then a facilitated patient case scenario session, both of which required students to use individual or collaborative knowledge ('knows how') in solving the issue at hand. The final session of simulated practice was pitched at the next stage of the triangle, and the students were expected to 'show how' to apply their knowledge and skill.

The 3 nominal group discussions yielded 4 themes in particular which related to principles of adult theory. These demonstrate how the students related to the learning opportunities presented through the IPE sessions. Arriving at these themes demonstrates how the NGT procedure has given the opportunity for students to reflect collectively amongst peers and also documents how students demonstrate the 3 dimensions of reflection described by Jay et al.[48] They initially describe the matter for reflection – an attitude, behavior or action within or as a consequence of the IPE session (descriptive dimension), the group discussion allows comparison of alternate views and perspectives of that same matter (comparative dimension), and establishment of a renewed perspective (critical dimension).[48] The data collection process has provided *'a place, a space, and a time for reflection'* as recommended by Clark,[49] that is essential for transformative learning where students can think about one's own thinking and that of others.[49]

SUMMARY

In light of finding the RIPLS and IEPS as ineffective in providing any information on development of students' readiness and motivation towards interprofessional working, we find that the NGT has been a successful way to capture student experience and record growth in learning and behaviors. The nominal group discussions and prioritized statements have provided participant students an opportunity to reflect on their experience. They have explored meaning and begun to understand how their experiences will aid in formulation of their plans and motivation for future learning and development. The chance to share the process with peers has seemed to facilitate the reflective capability of the student as ideas and perceptions are bounced off one another, refined and reconsidered. This outcome would support the global use of reflective portfolios by students undertaking an IPE programme, but with an added dimension of peer review and potentially assessment. In this way students would have longitudinal individual records of their journeys, as they navigate their own expectations, and emotions and the reactions to others and appreciate these in the context of subsequent behaviors and dynamics. The peer review component would allow students to revisit their experiences, compare and critique with others and potentially renew and progress their understanding towards achieving transformative learning. If each student is able to engage with this process effectively it could be invaluable to demonstrate to both students and staff, the growth in professional identity, attitudes and behaviors towards preparation for collaborative practice.

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Table 1. Classification of interprofessional outcomes as designed by Kirkpatrick/Barr[13,14]

Levels of outcomes	Types of outcomes
1. Learner's reaction	Participants' views of learning experience and satisfaction with the programme
2a. Modification of attitudes/perceptions	Changes in reciprocal attitudes or perceptions between participant groups, towards patients/clients and their condition, circumstances, care and treatment
2b. Acquisition of knowledge/skills	For knowledge, this relates to the acquisition of concepts, procedures and principles of interprofessional collaboration. For skills, this relates to the acquisition of thinking/problem-solving, psychomotor and social skills linked to collaboration.
3. Change in behaviour	Behavioural change transferred from the learning environment to the workplace prompted by modifications in attitudes or perceptions, or the application of newly acquired knowledge/skills in practice.
4a. Change in organisational practice	Wider changes in the organisation/delivery of care, attributable to an education programme.
4b. Benefits to patients/clients	Any improvements in the health and wellbeing of patients/clients as a direct result of an education programme.

Table 2. The timeline and descriptions and learning outcomes of IPE sessions within pharmacy programme Level 1 and the learning outcomes as classified by the Kirkpatrick/Barr model

Date	Context and educational theory	Description	Aim	Outcomes	Outcome level 1	2a	2b	3
Oct 2014	Anatomy session: Learn with (Communities of Practice)[26]	The session commences with a lecture given by the School's anatomy team to provide an introduction to anatomical terms, and then leads in to a practical exercise to allow students to learn with one another, across professional boundaries.	An introduction to the use of the professional language of anatomical terms. Students to meet those from another health professional group in the learning environment.	• Demonstrate an awareness of anatomical terms. • Articulate the rationale for the utilisation of specific anatomical terminology by health professions. • Demonstrate an understanding of the importance of communication in the learning process.	✓	✓	✓	
Feb 2015	IPE Game: Learn about (Communities of practice[26] and Information Processing Theory)[27]	The session is approached through the use of a board game to allow professions to work alongside one another in considering the roles and responsibilities of a range of health/social care professionals.	Students to build their awareness and understanding of roles and responsibilities played by different healthcare professionals.	• Demonstrate an understanding of the roles of different medical, social and healthcare professionals. • Demonstrate a developing awareness of the strengths of each specific healthcare profession. • Appreciation of the group-specific responsibilities. • Starting to recognise the strengths of each specific profession.	✓	✓	✓	
Mar 2015	Patient Safety: Learn from (Information Processing Theory)[27]	Session with newly qualified nurses and pre-registration pharmacists from the North Tees Hospital. Session comprises of 5 different clinical scenarios and focuses on patient safety and the role played by different healthcare professionals in these scenarios.	To build awareness and understanding of roles and responsibilities played by different healthcare professionals. Introduction to patient safety in relation to the medication error.	• Awareness that mistakes happen in the healthcare environment. • Understanding of the importance of communication by and between health professionals through the patient's journey.	✓	✓	✓	
Apr 2015	SimMan®: Learn with (Activity Theory)[28,29]	This session provides the first practice based simulation session around SimMan®-orientated scenario and focuses on an ACE inhibitors overdose situation.	Focus on team work, leadership and responsibilities.	• Demonstrate an understanding of the roles of pharmacists and medics in an emergency care situation. • Demonstrate a basic understanding of the way in which teams form, team roles and team dynamics.	✓	✓	✓	✓

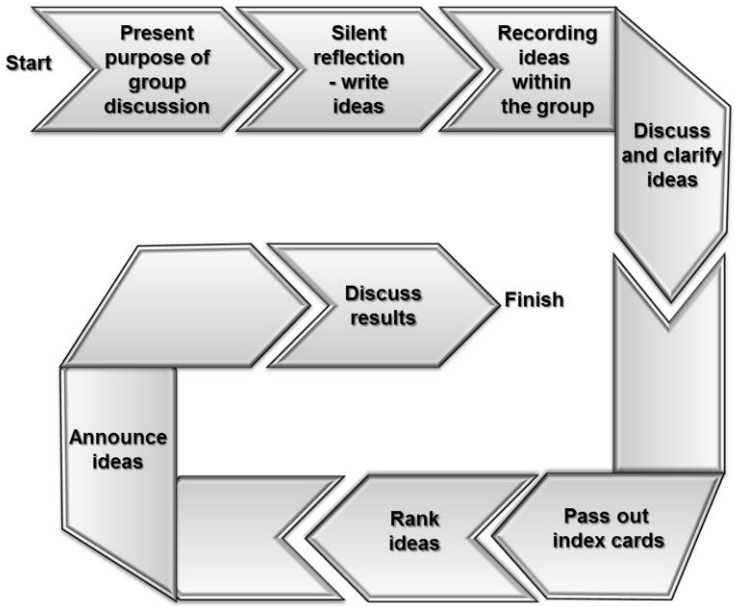

Figure 1. An activity flow diagram for a nominal group discussion.

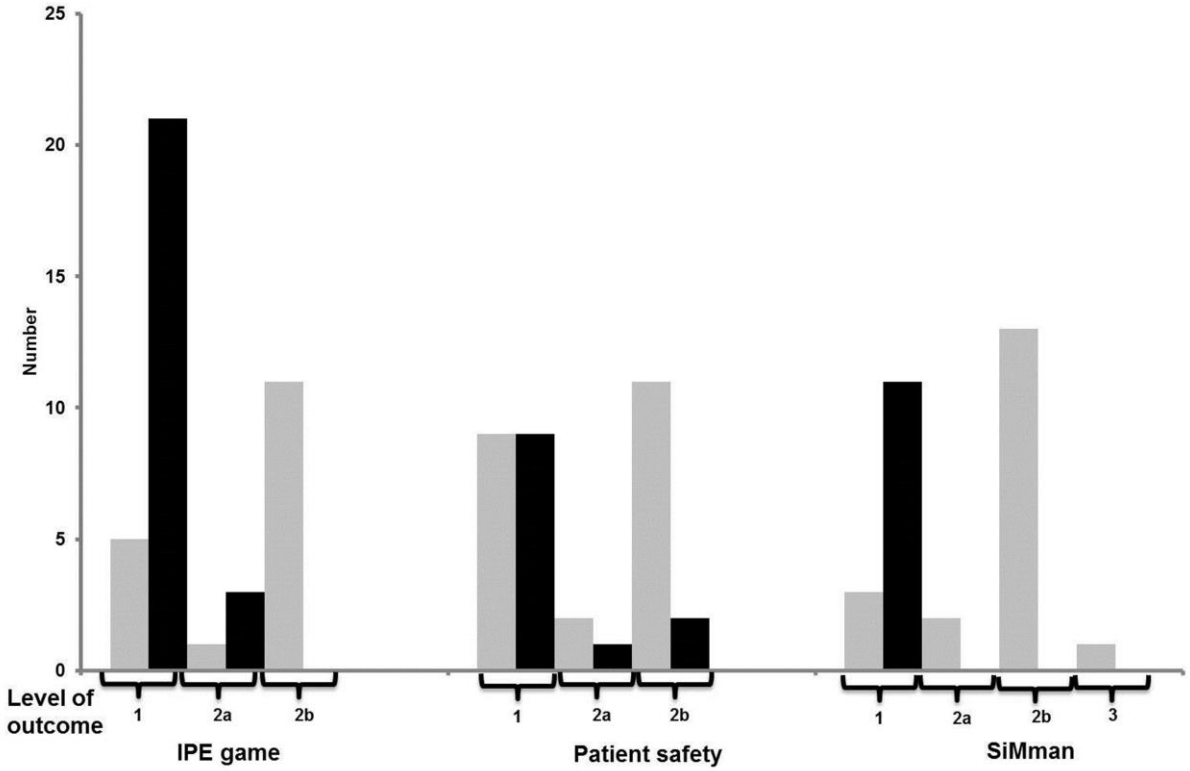

Figure 2. The number of statements of a positive (grey) and negative (black) connotation, from each of the NGT sessions that related to the levels of outcomes categorized by Kirkpatrick/Barr.[13,14]

Table 3. The 5 items ranked most important from the NGT discussions and the distribution of agreement across the cohort as derived from the final questionnaire.

IPE session	Ranked comments from NGT sessions	Classification of outcome per the Kirkpatrick/Barr model	Level of agreement across the cohort (%)				
			SA	A	U	D	SD
IPE Game	1. Medical students did not feel it was worth attending	1. Learner's reaction	41	46	8	5	0
	2. More healthcare professional students are welcome	1. Learner's reaction	18	38	22	18	4
	3. Not sufficient interaction	1. Learner's reaction	16	40	22	16	7
	4. Can appreciate differences and similarities between the 2 professions (pharmacy and medicine)	2b. Acquisition of knowledge/skills	35	41	11	11	0
	5. Session seemed more hospital focused rather than community (primary care)	1. Learner's reaction	9	43	30	14	5
Patient Safety	1. Allowed students to build confidence	2a. Modification of attitudes/perceptions	44	47	8	0	0
	2. Good patient cases and general content	2b. Acquisition of knowledge/skills	47	42	11	0	0
	3. We did not have enough background knowledge to tackle the tasks	1. Learner's reaction	14	19	22	33	11
	4. Helped students to build professionalism	1. Learner's reaction	58	33	6	3	0
	5. Teaches attention to detail	2b. Acquisition of knowledge/skills	44	42	14	0	0
SimMan®	1. Allows us to learn how to collaborate with medics to provide the best care for the patient	2b. Acquisition of knowledge/skills	70	27	2	0	2
	2. Showed importance of the content of the lectures	2b. Acquisition of knowledge/skills	59	36	5	0	0
	3. Allows us to appreciate the importance of our roles	2a. Modification of attitudes/perceptions	70	29	2	0	0
	4. The session was limited to medics and pharmacists	1. Learner's reaction	34	32	25	7	2
	5. It reflected a real life situation	1. Learner's reaction	70	29	2	0	0

SA= strongly agree, A= agree, U= undecided, D= disagree, SD= strongly disagree