Students and faculty perception of Active Learning: a case study

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ABSTRACT

Active Learning (AL), a pedagogical approach during which students focus on application of knowledge rather than memorisation was integrated into a new undergraduate pharmacy curriculum in a UK University. This paper evaluates student and faculty perceptions of AL. First and second year students enrolled on the pharmacy course and faculty members were invited to respond to an online questionnaire covering three domains: value, effort and instructor contribution during AL sessions. Thirty-five students (58.3%) and 9 (60%) faculty members participated in the study. Nine AL sessions were provided. A difference in the perceived effectiveness of AL between students and faculty was identified mostly in two AL activities: patient as teacher (an expert patient talking about his/her condition to pharmacy students) and prescription review. Students and faculty confirmed the value of the AL activities with agreeing and strongly agree. Students confirmed they put effort into these activities and recognised the instructor contribution during the sessions. Overall, students and faculty had a positive perception of the AL sessions.

INTRODUCTION

Teaching activities in higher education have traditionally focused on teacher-centered pedagogies, where instructors present knowledge to students, seeking to cover the requisite theoretical knowledge. This approach may assume that the passive student understands all they have been taught (Schmidt, Wagener, Smeets, Keemink & van der Molen, 2015). While traditional teacher-centered pedagogies may be considered more efficient when teaching large numbers of students, evidence suggests that active learning methodologies are better than large group didactic teaching in fostering learning and understanding (K. Singh, Mahajan, Gupta & Singh, 2018). Didactic teaching may negatively impact the capacity of students to understand and remember the material that they study (Ofstad et al., 2013; Freeman et al., 2014; Tangiisuran et al., 2018). Active Learning is defined by Miller and Metz (2014) as an instructional method in which students become engaged participants in the classroom, focuses on the application of knowledge, rather than its memorization. Such methods lead to improved educational outcomes and enhance students' critical thinking and team-working skills (Singh et al., 2018). The instructor is thus transformed from a sage on the stage to a guide on the side (Lomb, 2012), in student-centered pedagogy, wherein instructors encourage students to seek, synthesize and integrate information from a variety of sources, and assess performance in diverse ways (Rangachari, 2011). An active learning classroom not only improves student performance but could also promote a more inclusive classroom (Goodman, Barker & Cooke, 2018). These concepts informed the consideration of how to introduce active learning methodologies into the curriculum of a new undergraduate pharmacy course at the University of Sussex, (UK). This course, called Sussex Pharmacy, was established to enhance and transform the

student learning experience through an innovative approach to excellence in teaching and learning. The opportunity to start a new course in accordance with the General Pharmaceutical Council (GPhC) education standards (Pharmacyregulation.og, 2019) led to the development of an integrated curriculum focused on physiological body systems (e.g. respiratory, gastrointestinal, nervous system), underpinned by core clinical conditions (e.g. asthma, peptic ulcer, dementia) and a core medicines list (e.g. salbutamol for asthma, ranitidine for peptic ulcer and donepezil for dementia). These facilitate the horizontal and vertical integration of student learning across the disciplinary tracks that contribute to pharmacy practice and patient care (Rockich-Winston, 2017). Vertical integration is defined as the integration between the clinical and basic science sections of the curriculum, while horizontal integration blends either related basic science disciplines in order to enhance students' understanding of body systems or related clinical sciences through interdisciplinary clerkships (Rafique, 2014).

The study aimed to evaluate student and faculty perceptions of Active Learning introduced in a new and fully integrated pharmacy curriculum at Sussex University (UK).

METHODOLOGY

Study design

A cohort study, which is an observational study, was carried out between November and December 2017; the researchers collected the information provided by the participants without carrying out any intervention.

Study population

All pharmacy academics (n=15) were invited to participate in the study. Sixty pharmacy students enrolled in year one and two of the pharmacy course were also invited to participate.

Research instrument

A questionnaire called Assessing Student Perspective of Engagement in Class Tool (ASPECT) was developed and validated by Wiggins et al. (2017); this was adapted and employed as the research instrument.
The questionnaire had three domains: 1) value of active learning sessions, 2) effort during active learning, 3) contribution of the instructor during active learning. The question types were 5-point Likert scale. The authors suggested that this tool provides a rapid and easily administered questionnaire for measuring student perception of engagement in an active learning classroom (Wiggins et al., 2017). We added to the questionnaire a demographic section on age, gender, and ethnicity. Two other minor adaptations were introduced, such as to study the general perception of AL straight after the session and online instead of on paper. Two questionnaires were produced; one for students (21 questions) and one adapted for faculty members (20 questions). Permission for publishing the data collected using the questionnaire was granted by Wiggins on 3rd December 2018.

Questionnaire distribution

Links to the online questionnaires were emailed to all pharmacy students and faculty. Students were also asked in person during class to complete the survey. The online survey required about 7 minutes for completion. A text embedded onto the online questionnaire explained the term 'active learning' according to the definition provided by Miller and Metz (2014). A reminder email was provided after 1.5 weeks. Participants were informed that all data would remain confidential and would be discarded after 5 years.

Data Analysis

Data were visually inspected and assessed for normality using the Kolmogorov Smirnov Test. Data were not normally distributed, and the data dispersion is presented using the median and interquartile range (IQR). Results were presented using descriptive statistics. Data were analysed using Excel for MS Office and SPSS version 24.

Ethics approval

The study received ethics approval from the Life Sciences and Psychology Cluster-based Research Ethics Committee of the University of Sussex on 15th November 2017 (ref: ER/AM2078/1).

Informed consent and participation

Informed consent was obtained from all individual participants included in the study. Students and faculty received an invitation via email; they had the opportunity to read the invitation letter, the study information, and the participant information sheets before making their decision. Then, participants who agreed to participate, were invited to take the survey by clicking on the link provided within the invitation letter. In the information sheet, it was made clear that participation was on a voluntary basis and not compulsory.

Data protection

All data were treated following with requirements of the Data Protection Act (2018)

FINDINGS

Participant demographics

Thirty-five students completed surveys giving a 58.3% (35/60) response rate. Seventy-four percent were female and 26% were male. Ninety-one were in the 18-24 age category and 9% were 25-44 years old. Fourteen students (36.8%) were White/White British, 11 (31.4%) Asian/Asian British, seven (20%) classified themselves as Black/Black British/Caribbean/ African, two (5.7%) Mixed or Multiple

ethnicities and one (2.9%) Chinese. There was an almost equal divide between 18 (51.4%) students in Year 1 of the MPharm degree, and 17 (48.6%) in Year 2. Nine faculty members completed the survey, giving a response rate of 60% (9/15). Five respondents were female with the remaining four males. Seven (77.8%) respondents were aged 45-64 and two (22.2%) aged 25-44. White/White British respondents were 4 (44.4%) Asian/Asian British 3 (33.3%), two (22.2%) were Black/Black British/Caribbean/African. Eight respondents (88.8%) taught onto both year 1 and 2 of MPharm; besides, two (22.2%) also taught onto either the Biomedical Science degree or the Foundation year in Biosciences.

Participation in Active Learning (AL) sessions

The different types of AL sessions (n=9) introduced at Sussex are summarised in Table 1.

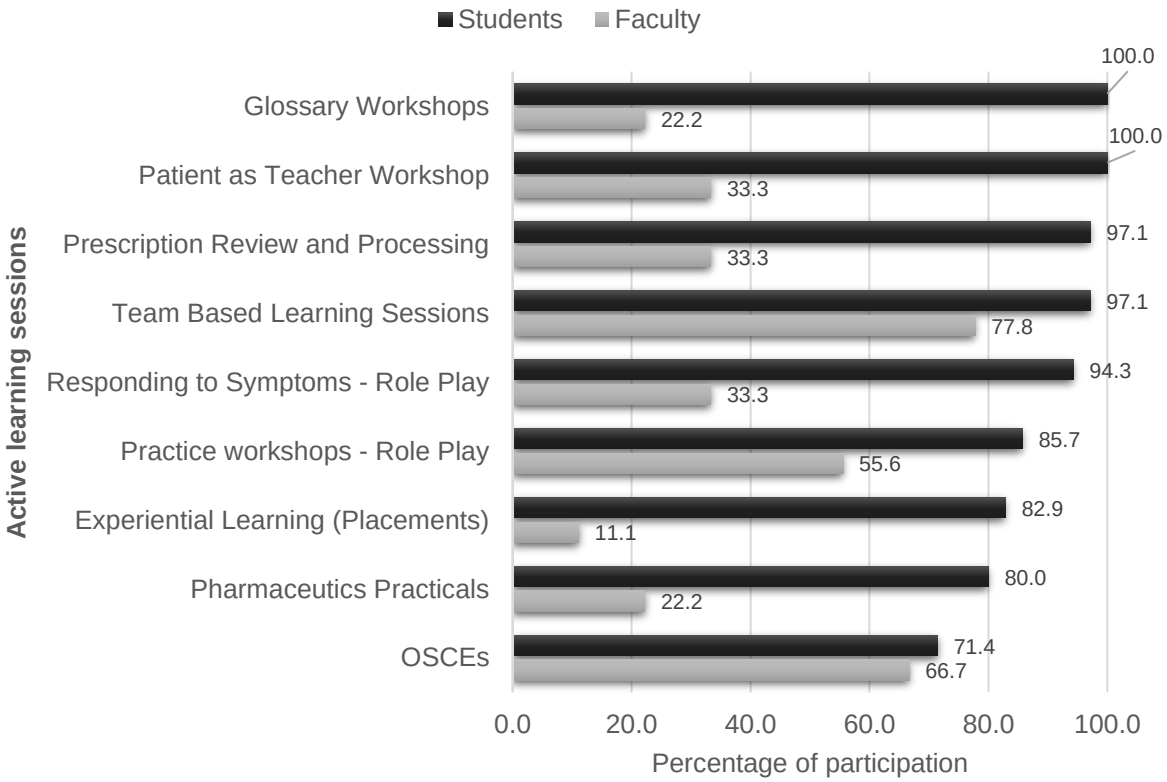
Table 1 Active Learning Methods employed at Sussex Pharmacy

Method	Abbreviation	Description
Experiential Learning (placements)	EL	Students are temporarily placed in a workplace to enable them to gain work experience
Prescription Review and Processing	PRP	Students learn to review and process a range of NHS/private prescriptions
Team Based Learning	TBL	Students read up on a topic before class and then engage in class team activities to encourage contextual learning.
Patient as Teacher workshop	PAT	Students have pre-workshops on pharmacy practice followed by structured encounters with volunteer patients with long-term conditions.
Responding to Symptoms: Role Play	RTS	Students role-play pharmacists and patients, learning to gather information from patients in a structured manner along with recommending a suitable treatment plan.
Glossary Workshop	GW	Student fill out a glossary describing keywords of a particular topic (e.g. diabetes) before class. In class, they carry out peer assessments while explaining and testing each other on concepts.
OSCE	OSCE	Objective Structured Clinical Examinations test students' clinical skills where 'actors' play the role of patients.
Pharmaceutics Practicals	PP	Students obtain practical experience of the formulation of a range of dosage forms in a practical setting

Practice Workshop: Role Play	PW	Imitating a hospital setting, students interact with a simulated human-patient to practice diagnosing and responding appropriately to their symptoms.

In eight of the nine AL sessions (Figure 1), the percentage of students' participation ranged from 80 to 100 (meaning that between 80% to 100% of students attended those sessions). The OSCE sessions showed the lowest level of students' participation (71.4%).
The higher level of faculty involvement was found in the team-based learning session (77.8%) and the lowest in experiential learning (placements) with 11.1%. Patient as a teacher, prescription review and responding to symptoms - role-play showed 33% of faculty involvement. The percentage of involvement in the OSCEs showed the smallest gap between students and faculty.
The Experiential Learning (Placement) showed the lowest involvement of faculty because only four members were involved in this session

Figure 1 Students' and faculty participation to Active Learning sessions



Perceived effectiveness of Active Learning

The perceived effectiveness of AL sessions was spread across the two groups. Not applicable (NA) was selected by both groups indicating that some students did not attend the sessions and some teachers were not involved in them. The highest scores were 5 and 4 were selected by both groups, 1 was selected more by faculty and 2 by students. Combining the percentages of the two highest scores (4 and 5) for students, the first was Prescription Review and Processing (88.6%), the second Patient as a Teacher (85.6%); for faculty, Team-Based Learning (77.8%) and responding to Symptoms-Role Play (66.7%) respectively. The lowest percentage achieved adding the higher scores (4 and 5) was 54.2%, while the highest percentages achieved adding the lower scores (1 and 2) was 11.2%; this has indicated the positive effects of AL perceived by students and faculty.

Table 2. Students and faculty scoring of perceived effectiveness of individual Active Learning sessions

Active Learning Activities		NA(%)	1(%)	2(%)	3(%)	4(%)	5(%)
OSCEs	Students	25.7			14.3	31.4	28.6
	Faculty	22.2	11.2			33.3	33.3
Glossary Workshops	Students	28.6		8.6	8.6	28.6	25.6
	Faculty	33.3		11.1			55.6
Practice workshops - Role Play	Students	11.4			14.3	48.6	25.7
	Faculty	22.2			11.2	44.4	22.2
Pharmaceutics Practical	Students	17.2			8.6	37.1	37.1
	Faculty	33.3			11.2	22.2	33.3
Patient as Teacher Workshop	Students			5.6	8.6	42.9	42.9
	Faculty	33.3	11.2			44.4	11.1
Responding to Symptoms - Role Play	Students	5.7			14.3	37.1	42.9
	Faculty	33.3				22.3	44.4
Team Based Learning Sessions	Students	2.9	5.7	2.9	20.0	31.4	37.1
	Faculty	11.1	11.1			11.1	66.7
Prescription Review and Processing	Students			5.7	5.7	34.3	54.3
	Faculty	33.3			11.2	44.4	11.1
Experiential Learning (Placements)	Students	11.4			8.6	22.9	57.1
	Faculty	33.3		11.1			55.6

Students and faculty perceptions of Active Learning according to three domains: 1) value, 2) effort, 3) instructor contribution

The number of statements used in the Likert-scale part of the questionnaire was 15 for students and 14 for faculty. It was decided that the statement “I make a valuable contribution to my group session” was appropriate for students but not for faculty. Therefore, this statement is marked as not applicable (NA) in Table 3 for the faculty. Figure 2 summarises in details the students and faculty perception of Active Learning using a 5-point Likert scale. Students mostly agreed to all statements. The number who were neutral was between eight and one, the ones who disagree/strongly disagree were between one and two (Figure 2). None of the faculty members strongly disagree with the statements, three disagree to three statements; the number who selected the neutral option varied between one and two (Figure 3). There was only one statement where faculty did not select strongly agree and chose agree instead: “Students are focused during the Active Learning sessions”.

Figure 2 Students perception of Active Learning according to the three domains *(Numbers included in the bars represent the frequency)*

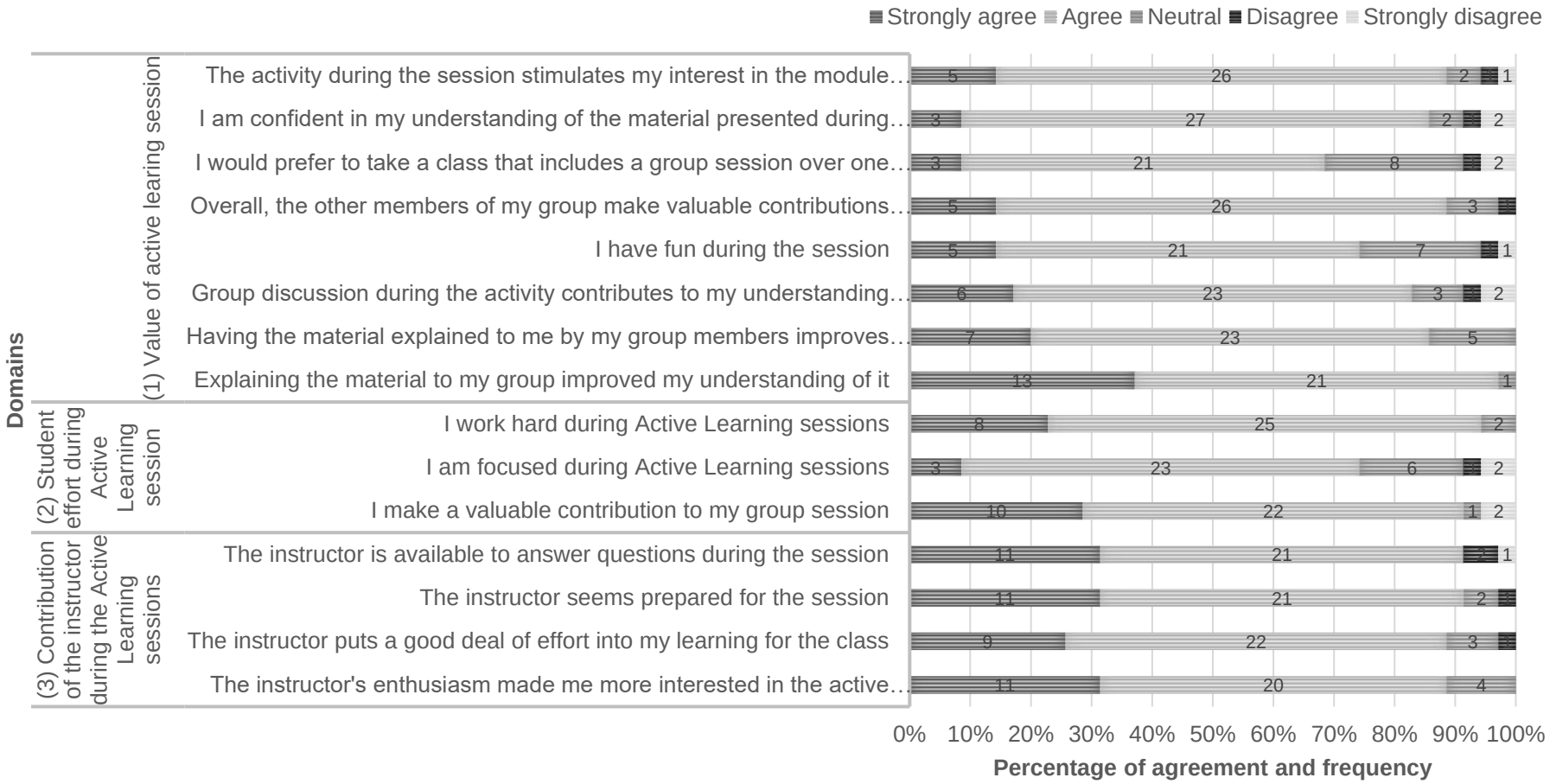
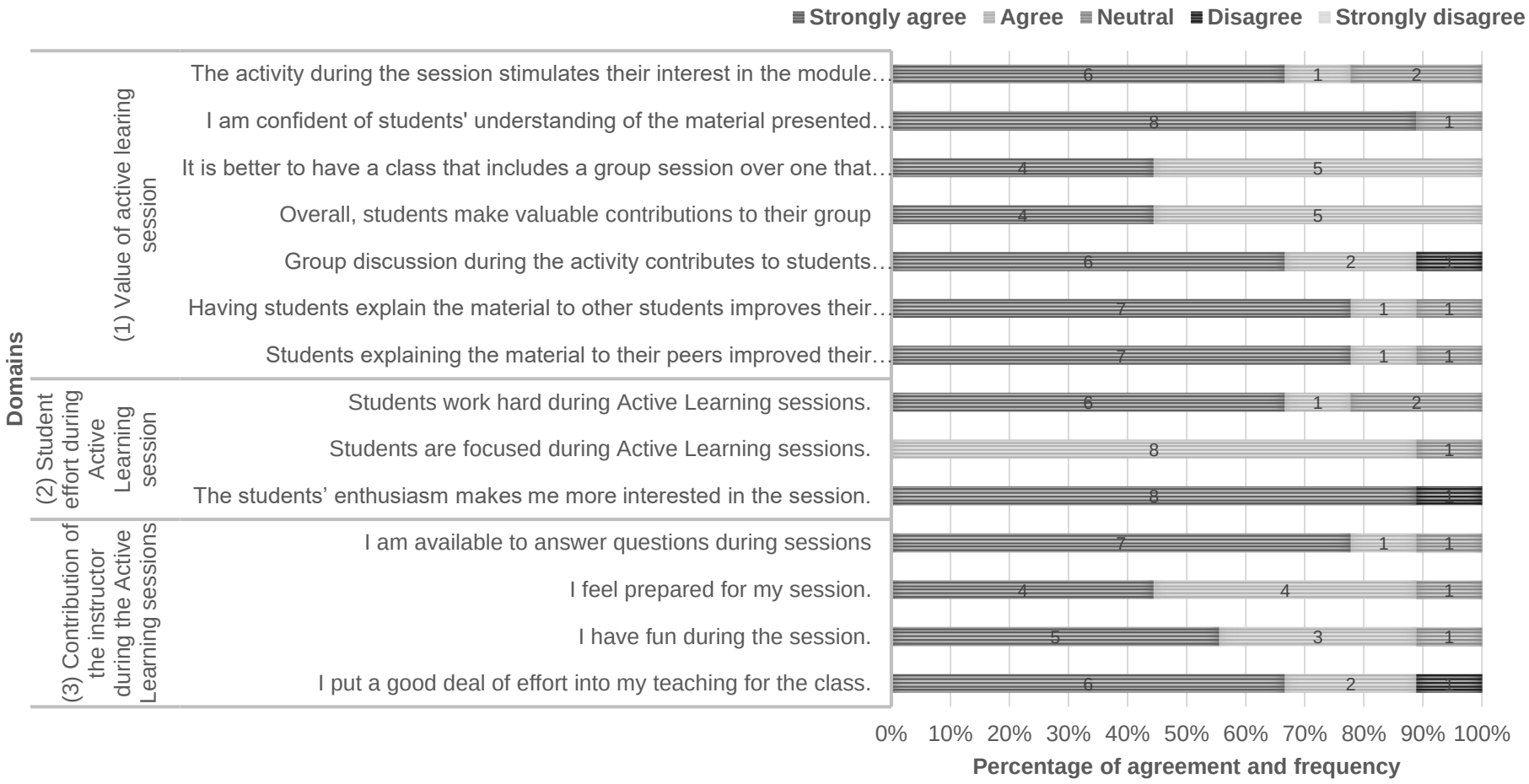


Figure 3 Faculty perceptions of Active Learning according to the three domains *(numbers included in the bars represent the frequency)*



Comparison of value, effort and instruction contribution between students and faculty

Data on Table 3 show that the median score obtained by students was 2 (agree), which was consistent across all statements. The median value obtained by the faculty was 1 (strongly agree) for eight, and 2 (agree) for six statements respectively. Overall students and faculty provided a very positive evaluation of AL regarding value, effort and instructor contribution. Fourteen statements were compared and summarised in Table 3. Four differences were related to the value of AL, one to instructor enthusiasm. Students agreed (2) with the following statement: “I make a valuable contribution to my group session”.

Table 3 Statements used for assessing the three domains according to students and faculty

Domains	Statements	Students (Median, IQR)		Faculty (Median, IQR)	
(1) Value of Active Learning session	Explaining the material to my group improved my understanding of it (Students explaining the material to their peers improved their understanding of it)	2	1	1	1
	Having the material explained to me by my group members improves my understanding (Having students explain the material to other students improves their understanding)	2	0	1	1
	Group discussion during the activity contributes to my understanding of the module material (Group discussion during the activity contributes to students understanding of the course material)	2	0	1	1
	I have fun during the session (I have fun during the session)	2	1	1	1
	Overall, the other members of my group make valuable contributions during the session (Overall, students make valuable contributions to their group)	2	0	2	1
	I would prefer to take a class that includes a group session over one that does not (It is better to have a class that includes a group session over one that does not)	2	1	2	1
	I am confident in my understanding of the material presented during Active Learning sessions (I am confident of students' understanding of the material presented during Active Learning sessions)	2	0	2	0
	The activity during the session stimulates my interest in the module material (The activity during the session stimulates their interest in the module material)	2	0	1	2
(2) Effort during Active Learning session	I make a valuable contribution to my group session (Not applicable to faculty)	2	1	NA	NA
	I am focused during Active Learning sessions (Students are focused during Active Learning sessions)	2	1	2	0
	I work hard during Active Learning sessions (Students work hard during Active Learning sessions)	2	0	2	0
(3) Contribution of the instructor during the Active Learning sessions	The instructor puts a good deal of effort into my learning for the class (I put a good deal of effort into my teaching for the class)	2	1	1	1
	The instructor's enthusiasm made me more interested in the active learning sessions (The students' enthusiasm makes me more interested in the session)	2	1	1	0
	The instructor seems prepared for the session (I feel prepared for my session)	2	1	2	1
	The instructor is available to answer questions during the session (I am available to answer questions during session)	2	1	1	1

Students' statement come first, (faculty second)
Likert scale points: 1=strongly agree; 2=agree; 3=neutral; 4=disagree; 5=strongly disagree
Data are presented as median and interquartile range (IQR)

DISCUSSION

Globally Pharmacy education is increasingly incorporating AL methods in line with greater evidence that this promotes meaningful student learning (Hoffart et al., 2016; White et al., 2019). Whilst much research has been conducted on the differences in student performance between passive versus active learning, less focus has been placed on the perceptions of AL that assesses engagement in the classroom (Beatty et al., 2009; Conway et al., 2010; Freeman et al., 2014; Wong et al., 2014). Trowler, in 2010, conducted a thorough literature review on student engagement on behalf of the higher education academy suggesting that there are three dimensions of engagement. Behavioral engagement, where students who are behaviorally engaged would comply with behavioral norms such as attendance, and involvement. Emotional engagement, where students who engage emotionally would experience affective reaction such as interest, enjoyment, and sense of belonging. Cognitive engagement, where the student who cognitively engages would invest in their learning, would seek to go beyond the requirements and relish the challenge. Kuh (2007) defined student engagement as the participation in educationally effective practices, both inside and outside the classroom which lead to a range of measurable outcomes. Wiggins et al., (2017) suggested that, during their use of the ASPECT questionnaire, the findings from focus group and the exploratory factor analysis (EFA) showed that task value and personal effort were the key factors in promoting student engagement. Furthermore, they added that student engagement has strong support in the socio-cognitive literature as well. Eccles in 2005 demonstrated that expectancy-value theory predicts that perception of an activity's value is positively correlated with student interest and engagement and that these elements are key factors in promoting student engagement too. In our study, more than half of students enrolled in the Sussex Pharmacy course and nine (out of 15) of faculty responded to the survey, showing a good interest and engagement in AL activities. Moreover, students and faculty perceive AL favorably in terms of its contribution to understanding and learning; these aspects are linked to Trowler's (2010) dimensions of engagement and match the definition of engagement provided by Kuh (2007). In line with Bloom's revised taxonomy (Krathwohl, 2002), AL encourages students to use higher-order cognitive skills to create meaningful learning. Results of the present study support the majority of literature pointing to more meaningful learning as a result of greater student engagement (Karimi et al., 2010; Allen et al., 2013; Freeman et al., 2014; Mesquita et al., 2015; Islam et al., 2017; Tangiisuran et al., 2018). An interesting finding was that, despite the positive perception of AL, in a few cases (3% to 29%) students did not provide a score (NA) regarding the effectiveness of AL sessions, which could suggest either that some students did not attend the session or prefer to take a class that does not involve active methods of teaching such as lecture. To a greater extent, this was also found in the study conducted by Tsang and Harris (2016), where faculty perceived AL sessions to be more effective for learning, compared to students, who preferred more isolated modalities like lectures. The authors found that students would prefer more module content to be covered in lectures, than in-group sessions. Tsang and Harris (2016) suggested that students also thought lower-order cognitive skills like memorising was more effective than higher-order skills like applying, indicating that those students perceived learning to only mean acquiring new information. The results of our study reflected the findings of Miller

and Metz (2014), who similarly observed that both students and faculty find AL methods to be beneficial to overall student learning. Another study had students rank eight AL methods based on their interest, satisfaction, and learning; students consistently ranked more enjoyable methods as more effective in fostering student learning (Tsang & Harris, 2016). Whilst the present study did not study intrinsic motivation, the majority of respondents had fun during AL sessions, which might correlate with their account of more effective understanding. There is a steady push towards incorporating AL in curricula around the world among healthcare education providers, lectures are still by far the most prominent form of instruction in North America at approximately 55% (Allen et al., 2013; Silverthorn, 2016; Tatachar et al., 2016; Tsang et al., 2016; Wiggins et al., 2017;). Miller and Metz ((2014) found that both students and faculty perceived AL to improve student exam scores by approximately 14%. Silverthorn (2006) observed increased long-term retention of material in students after undertaking Team-Based Learning. Faculty perceived AL to be difficult to implement due to lack of training in executing this in the classroom, a lack of administrative support and insufficient time required to develop new learning materials (Miller & Metz, 2014). Other studies also highlighted the lack of preparation and teaching time as a common difficulty (Allen et al., 2013; Miller et al., 2014; Tangiisuran et al., 2018). Nonetheless, the time spent on giving a lecture may not be as useful at a second glance given that students do not necessarily remember all the information they are presented in didactic lectures (Michael, 2007). Another concern for the effectiveness of AL is the physical arrangement of the classroom (Silverthorn, 2006). It is important that students can face each other and interact while the instructor can walk between students and interact with each one individually. However, in a study conducted by Michael (2007), faculty perceived class organization to be less essential, acknowledging that AL can be implemented in any environment. Students may perceive AL negatively if they are not reminded why this method of teaching is being used. If not communicated properly, they may assume that it is due to the laziness of the instructor, as opposed to practicing higher-order cognitive skills of Bloom's Learning Taxonomy (Tsang and Harris, 2016). Students typically face difficulty in adapting to new teaching methods if they have become accustomed to lectures because they have to rely less on the instructor (Tatacher et al., 2016). Silverthorn (2006) noted that while students experienced initial discomfort, most experienced a return of confidence and perceived the module highly.

Strengths and limitations

To be best of our knowledge it seems that this study represents the first application of the ASPECT questionnaire for the AL activities in a new MPharm curriculum. Furthermore, these AL activities were praised by the students and the pharmacy practice team won the "Students Led Teaching Award for outstanding and innovative teaching" during the academic year 2017-2018.

The present study did not measure perceptions of student preparation for AL sessions; this could also be included in future research. Furthermore, qualitative research using interviews or focus groups would be useful to better understand how students may learn more effectively and to investigate the discrepancy between students perceiving AL to be effective but not always preferred to take classes with AL. Although the present survey questions only addressed the immediate effects of AL on students' perception of understanding of material, it would be interesting to

measure their long-term retention of metacognitive ability (thinking about thinking) following active as opposed to passive learning methods. Due to the small sample size that was surveyed, especially of faculty, their views may not be representative of all pharmacy faculty. Another limitation to this study was the lack of a control group using only passive learning methods such as lectures, or self-study readings. Future research needs to include a comparator against other methods. Using an online platform to distribute the survey was convenient and facilitated survey completion and analysis. However, participants may have not put adequate thought into their answers when completing the survey.

CONCLUSION

This pilot study has presented the different AL sessions introduced and adopted at Sussex Pharmacy. Students and faculty expressed a positive perception of AL, which reinforces the idea that the teaching team introduced an innovative and potentially effective way of teaching and engaging students in higher-order thinking from year one. The study could be the foundation of a larger study, which might involve more than one school in Sussex and could inform the evaluation and introduction of a new pedagogical approach at the University.

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Contributors
Andrea Manfrin (AM) and Buge Apampa (BA) are the co-principal investigators (Co-PIs), Simin Wadiwala (SW) is the student involved in this research project. AM and BA designed the study, SW uploaded the questionnaires onto the web platform and collected the data. AM designed and conducted the statistical analysis. AM, BA and SW drafted the manuscript. AM and BA revised the manuscript. AM re-drafted the manuscript after the peer review and BA edited it. AM acts as the guarantor for the results.

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Ethical Standard
The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional guidelines on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. The study received ethical approval from the Life Sciences and Psychology Cluster-based Research Ethics Committee of the University of Sussex on15th November 2017 (ref: ER/AM2078/1).

Informed consent
Informed consent was obtained from all individual participants included in the study.

Anonymity and data storage
Data obtained were coded and stored electronically on a computer system at the University of Sussex, in a directory which is password protected. All data were treated in accordance with requirements of the Data Protection Act (1998) i.e. anonymised and stripped of any identifiable references to the participants.

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