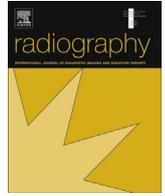




Contents lists available at ScienceDirect

Radiography

journal homepage: www.elsevier.com/locate/radi

Utilisation of a peer assisted learning scheme in an undergraduate diagnostic radiography module

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ARTICLE INFO

Article history:

Received 15 July 2015

Received in revised form

19 August 2015

Accepted 24 August 2015

Available online xxx

Keywords:

Diagnostic radiography

Education

Peer assisted learning

Peer to peer support

Critical reflection

ABSTRACT

Background: Peer to peer support programmes involve students supporting each other in either an educational, social and/or pastoral way. This is now common place in higher education institutes and has been proven to decrease student attrition and improve grades.

Aim: To evaluate a peer assisted learning scheme (PALS) within the University of Exeter undergraduate programme, where final year (stage 3) students held extra-curricular teaching sessions in an on-campus X-ray room throughout the academic term to support a first year (stage 1) module introducing basic projectional radiographic examinations, radiation safety, patient care and radiographic equipment. PALS sessions were unstructured and as such could involve roleplaying radiographic examinations, revisiting lecture material and/or discussing hospital placement or pastoral issues.

Methods: Brookfield's four lenses of critical reflection were used. 16 of 63 stage 1 students and 9 of 29 stage 3 students were electronically surveyed upon completion of the PALS sessions. Relevant colleagues and educational specialists were also informally interviewed. These were put in context with autobiographical reflections and the existing literature base on PALS.

Results: All agreed that the sessions provided a good environment for stage 1 students to improve their practical skills, revise lecture content, and gain confidence for upcoming clinical placements. Stage 3 students gained experience teaching students, an essential role of a graduate radiographer's job. Improvements around recruiting stage 3 peer leaders, sustainability, timetabling and session structure were explored.

Conclusion: The PALS proved to be a successful initiative within the undergraduate programme and will be continued into the future.

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A background on peer to peer support

Peer to peer (P2P) support programmes were first championed by Dr Deanna Martin from the University of Missouri in 1973 as a strategy to improve retention within “high risk” programmes of study.¹ These have since become commonplace with over 50 HEIs registered with the UK “national PASS network”.² P2P support programmes are broadly defined by Boud 2014 as “students learning from and with each other in both formal and informal ways”^{3(p4)} and typically fall into two broad categories:

- Peer assisted learning schemes (PALS) or Peer assisted study sessions (PASS) designed to support learning within a specific

discipline or module of study. This can take the form of pre-planned and structured extra tutorials, practicals or study sessions; or may be informal in nature.

- Peer mentoring (or “buddy systems”) where target students meet with more experienced students from their discipline to discuss a broader range of academic, social or pastoral topics.⁴

P2P learning is not intended to replace formal taught or pastoral components to a programme of study but rather should provide additional support. As such they are typically voluntary and extra-curricular. In the context of PALS, this will involve a staff member organising and overseeing arrangements (peer programme organiser), senior students facilitating the sessions (peer leaders) and the target students (mentees). Peer leaders are not required to provide “the answers” to mentees but rather to help guide their own individual learning.^{3,4}

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Clinical Imaging 1

University of Exeter (UoE) runs a three year undergraduate diagnostic radiography Bachelor of Science (Honours) programme. The undergraduate first year module “Clinical Imaging 1” (PAM1017) introduces students to the components of commonly used radiographic equipment, their principles and rationale for use, and practical elements such as performing routine projectional examinations. As a stage 1 module, PAM1017 also plays an important role in preparing students for their first clinical placement, which immediately follows the module.

PAM1017 involves 16 hours of formal lectures and 14 hours of practical sessions in the on-campus X-ray room, making it intensive for contact hours. With a cohort of approximately 60 students, practical sessions in the X-ray room are repeated 6 times with student groups of around 10 students. This represents a logistical challenge to provide students the time required to practice on the equipment, particularly quieter and less forthcoming students. To address this, in the 2014/15 academic year a PALS was established as part of the PAM1017 module alongside formal taught components. This report will discuss the development and evaluation of this PALS.

Development of the PAM1017 PALS

The PAM1017 PALS consisted of two weekly one hour drop-in sessions for stage 1 students (i.e. mentees), hosted by two to three rotational volunteer stage 3 students (i.e. peer leaders). Attendance was voluntary and the primary goal was to give mentees opportunities to have extra practice using the X-ray equipment, whilst also being able to ask peer leaders for advice on lecture content or about the practicalities of clinical placement. The sessions would also give peer leaders some practical teaching experience and provide a career development activity. Sessions were unstructured and were to be guided by the mentees questions and perceived needs. Mentees were not required to do any formal preparation for the sessions but were encouraged to bring questions and areas they wanted to improve on to make the sessions more useful. Peer leaders were not asked to prepare specifically for sessions, but rather to expect any potential questions relating to stage 1 studies. Sessions were held without the direct presence of academic staff in the on-campus X-ray room, with the generator disabled but equipment otherwise operational.

Planning for the sessions initially began before the module started. Suitable timeslots were identified on the stage 1 and stage 3 academic timetables, being mindful of assessment deadlines. An early identified peer leader then advertised the scheme to the stage 3 cohort and used a *Doodle* poll to organise volunteers. The PALS timeslots were also intensively advertised to mentees during lectures and via emails.

Evaluating the PAM1017 PALS

Brookfield's “four lenses of critical reflection” were adopted in order to retrospectively gauge the views of key stakeholders regarding the PAM1017 PALS.⁵ An anonymous and confidential open-ended SurveyMonkey questionnaire was sent to mentees and peer leaders involved (i.e. the “student lens”; see [Appendix A](#)); relevant academic colleagues and educational specialists at UoE were informally interviewed (i.e. the “colleague lens”); and my own autobiographical reflections were recorded (i.e. the “autobiographical lens”). This was put in context with the existing literature base on P2P support programmes (i.e. the “theoretical lens”).⁵ As this exercise was an audit activity of teaching practice, ethical approval was not required under UoE policy. However, all involved

were informed that their anonymised views could contribute to publication.

The “student lens”

Mentee PALS feedback

16 of 63 mentees responded. 2 respondents had attended weekly sessions every week with other respondents having a wider range of attendances from one to five of the seven weeks of PALS sessions offered. Four had not attended any sessions citing reasons such as feeling they had too much other academic work to do, timing issues with the sessions' timetabling, and in the case of one student: “laziness”.

The 12 students who had attended sessions all agreed they were a useful initiative. Many agreed it was helping them prepare for their upcoming clinical placement and provided a useful opportunity to go over lecture and practical content. This also extended to include insight into future modules and other general academic aspects of the course.

“I found this a less pressured environment and as there were generally smaller groups/ 3 students they were really good for support. No set content = brilliant!! Means we can ask to go over anything”

“Good advice for surviving the placements as well as the degree.”

Students felt they benefitted from different perspectives on radiographic positioning techniques for common X-ray examinations, which can be subject to personal professional preferences in technique. Students reported receiving useful tips on patient care particularly with challenging patients, linking in with an adjacent patient care module. This is useful as in taught sessions there is only time to go over the positioning of a “compliant” patient.

“I really felt that these extra sessions was where a lot of the learning of positioning took place - there was more one on one time.”

“They were useful to gain extra practice with the equipment and ask the stage 3 students questions we might not ask the lecturer.”

Some comments suggested the PALS sessions had a pastoral element with students feeling supported and “put at ease” by hearing stories from peer leaders on their experiences both academically and at hospital sites.

“I feel less worried about the placement, hearing the seniors' stories and experiences of it.”

Other benefits reported included gaining self-confidence and improving interpersonal skills. One student commented on a greater appreciation and respect of the role of the diagnostic radiographer. Peer leaders also noted PALS opened the mentee's eyes to the size of the task ahead of them and the wide range of patients and experiences they will be seeing. Peer leaders also commented mentees found it motivational to see peer leaders teaching with a good knowledge base after a relatively short period of study.

Some mentees suggested the sessions would work more efficiently if they were pre structured, reducing the initial discussion of what was to be covered in the session. However this also goes against some comments of praise for the informal “drop-in” nature of the session.

Peer leaders PALS feedback

There were 9 peer leader respondents from the 29 students who helped out during the term. Most respondents had only participated in one or two sessions as it was the initial intention to “share the load” of work amongst the peer leaders during a busy academic term.

Peer leaders mentioned a range of benefits acknowledging that working with students would be an important role for them as graduate radiographers. They believed sessions helped them improve their communication, in particular describing complex radiographic techniques through verbal and practical displays. This included patience and explaining things in more than one way to help students with different learning styles or abilities. Peer leaders also developed the ability to provide encouraging, positive and constructive advice to different students.

“I felt it allowed me to begin to learn how to teach students in a positive constructive manner who I will soon be teaching in a job.”

“As a naturally shy person this was good practice talking to groups.”

Peer leaders took confidence and reassurance from the knowledge they could recall and pass on to mentees. Similarly, students felt it was good continued professional development as a reflective activity. Questions from mentees made peer leaders think about their experiences, what they had learnt, what worked well and/or what they wished they had done differently. The whole PALS experience also made them reflect and appreciate how far they had come in a few short years.

“I found it useful as it was like a reflective practice for me as the first years were asking: how I found placement, what to do for assessments, what shoes are appropriate to wear & why, what skills do the radiographers like to see i.e. communication, organisation, commitment etc.”

“Seeing how much further I had developed over the 3 years ... it was shocking at times!”

Peer leaders who role-played patient scenarios also reflected on how they gained empathy for the vulnerable position patients are in when under the radiographers care for an examination. Peer leaders reflected how hard it was for mentees working with the general public whilst learning, and how this empathy for the student could help them when practicing as a graduate.

“I think it has made me more aware of how things are from the patient's perspective e.g. comfort. It also made me understand how the body language/ communication received from the radiographer affects the patient's confidence and trust in the radiographer.”

In terms of improving sessions there were comments about group sizes being too big and too small, a reflection of the variability in attendance by mentees (attendance at sessions varied from between 3 and 15 students). Also some peer leaders would have preferred some more structure or preparation time for certain topics, or at least general themes to the sessions (such as image interpretation, the first week of placement, imaging of the chest etc.), although again they also did reflect on the benefits of the informal open nature of the sessions. There was one comment that some mentees did not necessarily have questions to ask but were merely attending either as “spectators” of the session, or just wanting to be “taught at” whatever they could (or both).

The “autobiographical lens”

Being the second year I had run PAM1017 I was interested in finding outlets of extra support for students who required it. I was also aware of how group dynamics can play a negative part in my taught small group sessions, often sensing a general reluctance to come forward with questions. I expected the PALS to also have a pastoral role for some students to gain support and confidence for the upcoming clinical placement. However, I had some reservations about peer leaders giving the wrong impression on specific clinical sites based on their own personal experiences.

One initial concern was the potential unwillingness of stage 3 students to get involved as peer leaders or alternatively handling volunteers not suitable for the role due to their academic ability, untrustworthiness, or potential to bring a “personal agenda” to sessions. This was not realised and I suspect upon reflection poor candidates are less likely to volunteer. I was pleasantly surprised by the engagement of peer leaders, noting in most cases their primary motivation was that they enjoyed passing on their new “niche” knowledge to others and they enjoyed playing the teacher. This gave me confidence about the sustainability of the programme.

I was less concerned about mentee numbers, as long as those students who required extra help had access to PALS sessions and could do so in a relaxed environment without many other students present. Indeed I believe the initial success of the first week of PALS sessions may have been detrimental when around 15 mentees arrived to both sessions, making the sessions less “intimate” than intended.

The challenge for me remains to judge my own involvement in the planning of sessions to ensure the quality and accuracy of the advice peer leaders give their mentees. Over-controlling the sessions may restrict their informal nature, but I am also aware of the risk of potentially passing on poor practice across student cohorts. This may be more pertinent to the use of PALS within diagnostic radiography when compared with other educational fields where topics may be exploratory or conceptual.

The “peer lens”

Staff colleagues from within medical imaging were informally interviewed, as were staff from the UoE “Education Quality Enhancement Team”. Video recorded interviews of academic staff who had been peer programme organisers at UoE in different undergraduate programmes were also accessed.⁶ There was agreement that PALS gave an extra outlet to gauge what topics students needed extra support with in a timely manner. Sessions could also be particularly helpful with new international or widening participation students, encouraging cross communication within cohorts of the same programme and fostering a supportive student community within the discipline. This is particularly relevant to diagnostic radiography, where students often face a unique academic timetable and extended periods of time off campus whilst on clinical placements.⁶

The challenges that academic staff reported included making new students aware of the programme and its potential benefits as early as possible, particularly for mentees during term 1. Forward planning and good preparation were seen as key. This is particularly challenging within our programme as stage 3 students are on placement in term 1, making organisation and recruitment challenging.⁶

Peer programme organisers recommended having established boundaries for peer leaders. This included formal communication outlets for peer leaders (such as group email and not personal emails) and similarly to train peer leaders on what is expected of them, and just as importantly, what is not. Peer leaders should

avoid advising on assessment items or giving personal recollections of what content made them pass academic work. It is recommended that peer leaders avoid forming a close friendship with mentees outside of sessions and that they should know when not to advise on issues of a personal nature or outside their expertise. However they should know who they can refer students to for further guidance.^{3,4,6} Although I did not witness these problems, training is planned for future peer leaders to make them aware of these issues within medical imaging, where the small cohorts and often insular nature of the programme could exacerbate some of these issues.

Peer leaders from outside the programme thought P2P sessions helped their mentees gain discipline with their studies throughout the term and ultimately promoted independent learning, a key goal of higher education. All agreed their various peer support programmes could reduce the stress of University for mentees, providing a way of gaining information for students too shy or unconfident to ask teaching staff, an area I am definitely conscious of within our undergraduate programme.⁶

Comments from other peer leaders also found teaching others solidified their own understanding of a topic or identified their own areas of weakness, as teaching content required a deeper processing of the content.⁶ This supports the well-known idiom “if you really want to understand something, try and teach it”.^{7(p95)}

The “theoretical lens”

The emergence of P2P support programmes is in keeping with modern drivers within higher education to instil students as active participants in the University community.⁸ This challenges a traditional view of the student as “consumer” or “service user” and demands that they actively engage not only in their own learning, but positively changing the landscape of the University for concurrent and future students.^{9,10} This could include student involvement in assessment, curriculum design, subject based research, or consultation around effective teaching and learning within their discipline.⁸

Not only does this benefit the University but the individual student develops a range of skills outside the curriculum, facilitating “intellectual independence”.¹⁰ This approach also utilises the valuable resource of our students. Although at times students may have limited teaching or academic knowledge they are experts at how to reach and engage student groups.⁹ This expertise has been particularly valuable when preparing mentees for their first clinical placement. My experiences also support the evidence suggesting students also prefer this “active” role over a “passive” voice, and that engagement increases when their role can generate more immediate change.^{11,12}

Within the context of higher university fees for students in the UK, research also suggests that students expect increased contact hours at University.¹³ Although many UK radiography students are on NHS bursaries, they too are often heavily invested financially in the course and thus have high expectations. Jackson et al. identifies that this desire for physical teaching contact on campus along with the desired off campus “connectivity” with teaching staff is often difficult to provide, with increasing expectations of timely staff engagement with e-technologies such as email, wikis, forums etc.¹⁴ P2P learning can offer a middle ground providing on campus contact, active learning and real time feedback, but with reduced reliance on staff time.

Evidence also suggests students value active learning, with over 50% of respondents to student experience research in 2012 agreeing “more interactive group teaching sessions/tutorials” would improve the quality of their University experience.¹⁵ As such, it is important that peer leaders appreciate their role is not to

“teach” content but to foster independent learning by encouraging active learning outlets and creating an atmosphere that appreciates different learning styles.

This is very applicable to radiography with many students having a practical hands-on mind-set. With respect to the PAM1017 PALS, it was an initial goal to ensure students moved from the “surface learning” in taught sessions, which is often approached by many students as enough to get them through assessment, to the “deep learning” that will be most beneficial to their eventual practice.¹⁶ Students will be developing this deeper learning through “performances of understanding” by reflecting on what they have learnt in lectures, testing knowledge against their peers and peer leaders, applying knowledge and gaining experience with X-ray equipment and potentially extending this to unfamiliar scenarios.¹⁷

Despite its wide adoption and this sound rationale for P2P learning, it is difficult to establish a strong evidence base on its effectiveness. The majority of evidence on P2P learning is linked with higher grades, better retention and lower failure rates.¹ However, fewer studies address the qualitative aims of PALS, such as whether students are more motivated and engaged, are more comfortable or happier within the University environment, or are more active “independent learners” gaining more transferable skills for the workforce. There are also gaps in research pertaining to the particular effectiveness of PALS for perceived “at-risk” students such as international students, mature age students, or “first-in-the-family” students, who were more likely to attend the PAM1017 PALS sessions. Research on the topic is also prone to publication bias and study design issues, in particular “self-selection” issues as it is difficult to ethically moderate or account for those students attracted (or not) to PALS. This of course will ultimately alter the effect size of P2P learning as an intervention.¹

Boud also identifies other challenges with PALS such as dealing with the inevitable individual dynamics between student groups. The peer programme organiser may have to deal with personality clashes or cultural misunderstandings, power struggles amongst students, general indecision or timewasting amongst the group, differing expectations from sessions, mistrust from mentees on the abilities of peer leaders, or peer leaders or mentees who bring dominate personalities or potentially negative baggage into sessions.³ These group dynamics may also not be reported and if so tensions can build up. I can appreciate the challenges this brings, such as being tuned into the signs of student disharmony, and also having a “light touch” to steering the group in the right direction so as not to be a dominate presence. Similarly, Boud identifies “letting go” of the content of the curriculum and giving students the freedom to learn can also be a challenge for staff.³

Summary and recommendations for the future

Applying Brookfield’s model of critical reflection has been a useful exercise in gauging opinions and placing the PAM1017 PALS in the broader picture of modern higher education. The application of P2P support programmes within diagnostic radiography was not identified elsewhere in the literature base.

There have been some limitations to the evaluation. The quality of the instruction provided by peer leaders has not been assessed, nor the consistency across sessions. This is difficult to truly evaluate as assessing the quality of teaching will require observation by an academic, which can inherently change the dynamics of sessions. Also, only one group of students has been evaluated, of which only a small number responded, making results potentially less transferable, particularly with the dependence of PALS on group dynamics.

However, this evaluation can still guide further improvements with future PALS in the field of diagnostic radiography. The initial intention was to make the PALS very flexible in terms of content and delivery. Despite some praise for this approach, critical reflection suggests that adding more structure to the scheme could provide benefits. Developing formal intended learning outcomes (ILOs) for the sessions may also be valuable, providing clarity to both peer leaders and mentees on the intended purpose of PALS and also promoting the benefits of the sessions. This could include objectives to aim for within the discipline as well as transferable skills (e.g. describe the techniques of basic level x-radiography; work co-operatively; demonstrate problem solving skills). This would bring PALS in line with the constructive alignment approach adopted by UoE in module development which are set in such a way as to guide students to what they need to learn (and learning activities are recommended) but ultimately students can construct their knowledge in their own preferred way.¹⁸

Ideas for structuring the session could include mentees forwarding questions or areas for discussion/practice prior to sessions, or peer leaders pre-setting topics based on ILOs or observations from previous sessions. This would then still provide flexibility for tangents or unrelated questions during sessions. These topics/questions could also be provided to all mentees before sessions to allow pre preparation and better engagement.

In future, the PAM1017 PALS will aim to recruit a smaller core group of stage 3 peer leaders. This would require more time commitment from peer leaders, but also more benefits for themselves and mentees. This could include better guidance and “induction training” with respect to setting boundaries, tailoring the expectations of the sessions, and techniques for maximising the sessions. Likewise some of the potential challenges of group dynamics could be avoided with a more involved peer leader recruitment process ensuring motivated and altruistic students become peer leaders. Ultimately this should also improve the quality and consistency of the sessions. This recruitment process would also increase the workload of peer leaders so it is important to develop rewards and/or recognition for the hard work of these students. This has started with a University wide peer leader recognition ceremony and CPD certificates being issued.

There is also potential to expand PALS into other traditional areas of weakness within diagnostic radiography such as radiation physics, image interpretation, or generic study skills such as assignment writing, study skills or referencing.

Conclusion

Implementing, running and evaluating the PAM1017 PALS has been an interesting and rewarding experience. There is no doubt that the PALS has a place in the UoE undergraduate programme but the challenge remains to ensure its sustainability and optimise its benefits for the peer leaders and mentees involved.

Conflict of interest statement

There is no conflict of interest to declare.

Appendix A. SurveyMonkey questions sent to students:

Stage 1 Questions:

Q1: How many PAL sessions did you attend?

Q2: If you did not undertake any PAL sessions please tell us why. Please then skip to Question 8.

Q3: If you did participate in PAL sessions, how useful did you think the sessions were?

Q4: What did you think were the benefits of the PAL sessions for you personally?

Q5: What did you learn from the PAL sessions?

Q6: Was there anything about the PAL sessions that you did not like?

Q7: What do you think the stage 3 students gained from participation in the PAL sessions?

Q8: Do you have any ideas for improving PAL sessions in the future?

Q9: Is there any other aspects of the medical imaging programme which you think could benefit from PAL.

Q10: If you are willing to be contacted with further questions about the PAL scheme please complete this section. This is optional.

Stage 3 Questions:

Q1: How many PAL sessions did you participate in?

Q2: If you did not participate in any PAL sessions please tell us why. Please then skip to Question 8.

Q3: If you did participate in PAL sessions, how useful did you think the sessions were?

Q4: What do you think the benefits of the PAL sessions were for you personally?

Q5: Do you think you learnt any new skills by participating in the PAL sessions?

Q6: What do you think the stage 1 students gained from the PAL sessions?

Q7: Was there anything you did not like about the PAL sessions?

Q8: Do you have any ideas for improving the PAL sessions in the future?

Q9: Is there any other aspects of the medical imaging programme which you think could benefit from PAL sessions? Or any other general comments?

Q10: If you are willing to be contacted with further questions about the PAL scheme please complete this section. This is optional.

References

1. Dawson P, van der Meer J, Skalicky J, Cowley K. On the effectiveness of supplemental instruction: a systematic review of supplemental instruction and peer-assisted study sessions literature between 2001 and 2010. *Rev Educ Res* 2014;**84**(4):609–39.
2. PASS National Centre. Welcome to the PASS National Centre: University of Manchester; n.d. [11/05/2015]. Available from: University of Manchester.
3. Boud D, Cohen R, Sampson J, editors. *Peer learning in higher education: learning from and with each other*. Abingdon: Routledge; 2014.
4. University of Exeter. Peer Support n.d. [11/05/2015]. Available from: <http://www.exeter.ac.uk/student-engagement-skills/peersupport/>.
5. Brookfield S. *Becoming a critically reflective teacher*. San Francisco: Jossey-Bass; 1995.
6. University of Exeter Education Quality and Enhancement Group. Peer support video wall: University X; n.d. [11/05/2015]. Available from: <http://eqepeersupport.blogspot.co.uk/>.
7. Exley K, Dennick R. *Small group teaching: tutorials, seminars and beyond*. London: RoutledgeFalmer; 2004.
8. Healey M, Flint A, Harrington K. *Engagement through partnership: students as partners in learning and teaching in higher education*. The Higher Education Academy; July 2014.
9. Kay J, Dunne E, Hutchinson J. *Rethinking the values of higher education – students as change agents?*. Gloucester: University of Exeter; The Quality Assurance Agency for Higher Education; September 2010.
10. Schwartzman R. Are students customers? the metaphorical mismatch between management and education. *INDIANAPOLIS Education* 1995;**116**:215–22.
11. Cooper B. Students as partners: embracing the New Paradigm in mathematics. *MSOR Connect* 2014. <http://dx.doi.org/10.11120/msor.2014.00022>.
12. Trowler V, Trowler P. *Student engagement evidence summary*. Department of Educational Research, University of Lancaster; 2010.
13. Kandiko CB, Mawer M. *Student expectations and perceptions of higher education: executive summary*. London: King's College London; Quality Assurance Agency; 2013.
14. Jackson N, Oliver M, Shaw M, Wisdom J, editors. *Developing creativity in higher education: the imaginative curriculum*. Routledge; 2006.

15. National Union of Students, Agency QA. *Student experience research 2012. Part 1: teaching and learning: student experience research to gain insight into the quality of the learning experience London*. National Union of Students; 2012 [11/05/2015]. Available from: www.nus.org.uk/PageFiles/12238/2012_NUS_QAA_Teaching_and_Learning.pdf.
16. Marton F, Hounsell D, Entwistle N, editors. *The experience of learning: implications for teaching and studying in higher education*. Edinburgh: Scottish Academic Press; 1997.
17. Healey M, Solem M, Pawson E, editors. *Introduction. Active learning and student engagement: International perspectives and practices in geography in higher education*. London: Routledge; 2010.
18. Biggs J, Tang C. *Chapter 4: using constructive alignment in outcomes-based teaching and learning. Teaching for quality learning at University*. Maidenhead: Open University Press; 2007.