Graduate Employability: Student Perceptions of PBL and its Effectiveness in Facilitating their Employability Skills

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Abstract

The percentage of recent graduates employed in lower skilled jobs increased from 26.7 per cent in 2001 to 35.9 per cent, in the final quarter of 2011, while approximately one new graduate in every five available to work is unemployed (ONS, 2012). It is therefore a matter of urgency for higher educational institutions to investigate ways that can increase student opportunities to develop their employability skills within the curriculum. This study implemented a problem-based learning (PBL) approach in to the curriculum across all three levels of an undergraduate Sports Psychology program. Student perceptions of their satisfaction with and how important they felt a PBL approach was in facilitating their employability skills were investigated. Results indicate that regardless of whether students liked, disliked or were unsure of PBL, they all reported that PBL facilitated their employability skills. The paper concluded that PBL is a viable form of teaching when looking to facilitate student employability skills.

Keywords: Graduate employability; PBL; scaffolding; student-centred learning

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Introduction

Over recent years there has been a shift in the higher education landscape in the United Kingdom with the motivations for university study increasingly coming from the perspective of future employment potential. In a recent poll 60% of parents with children aged 11 to 17 claimed the primary reason for university education was to get a better job (Grove, 2012). Conversely, the Office of National Statistics in the United Kingdom reported that more than one in three recent graduates are now working in lower-skilled jobs (ONS, 2012). Taken together this information would seem to imply that a number of graduates are currently employed in a non-graduate job.

Indeed, in the field of engineering there are already suggestions that education must train future engineers to "think flexibly and to be adaptive, as it is unlikely that their future will have them working in one domain" (Nagel, Pappas, & Pierrakos, 2012, p.72). Consequently, an argument can be made that higher education must guarantee that future graduates are equipped with 'generic' employability skills that are adaptive to a variety of work related environments, for example the ability to manage information, communicate with others, solve problems and learning to prioritise. All of these can be learned via a well designed curriculum (Fallow & Steven, 2002) that integrates employability skills alongside effective learning strategies (Pegg, Waldock, Isaac, Ruth, & Ruth, 2012).

This means that in this context education must adopt an *anticipative* educational approach to move with the ever changing economic landscape (Sterling, 2008) by exploring educational frameworks that prepare students so that they are capable of taking responsibility for their own actions (Godemann, Herzig, & Moon, 2011; de Haan, 2006) whilst helping to shape the future (Burmeister, Rauch, & Eilksa, 2012). Further support for the inclusion of employability skills into the curriculum comes from the findings of a UK government commissioned review of business and university collaboration, which recommend that universities should use formal leaning strategies as a vehicle to optimise employability skills, so that students are able to clearly identify the skills that they have learned (Wilson, 2012). This is important as although one in five jobs requires a degree, employer's stated this was not enough to secure graduate employment (Yorke, 2004; Wilson, 2012). However, for education to be effective it is essential that any change to the curriculum is not just seen as a bolt-on component that leaves established methods

untouched (Azapagic, Perdan, & Shallcross, 2005; Huntzinger, Hutchins, Gierke, & Sutherland, 2007; Shriberg, 2002; Sterling, 2008), but a new approach 'that nurtures the increasingly important qualities of adaptability creativity, self-reliance, hope and resilience in learners' (Sterling 2008, p.65).

Problem-Based Learning and Employability Skills

One method of introducing employability skills in to the curriculum is by adopting a problem-based learning (PBL) approach which helps learners construct knowledge in contexts similar to the real-world environments (Beachey 2007). During the PBL process students initially collaborate with their group members to identify what their current understating of the problem is and where gaps are in their knowledge are, before undertaking self-directed research where finally the information gathered is applied to the proposed solution (Hmelo-Silver, 2004). In the past PBL has been used in architecture, engineering, law, business and management and social work (Savin-Baden, 2000) and has been shown to develop independent, creative thinking and practical skills (Duncan & Al-Nakeeb, 2006), stimulate group and self-directed student-centred learning (David & Irizarry 2009; Macdonald & Savin-Baden 2004) and train students in group dynamics (Joham & Clarke (2012).   However, PBL is not without its critics, with students previously reporting that they have difficulty within the group environment (Dahlgren & Dahlgren, 2002; Miller & Peterson, 2003; Spronken-Smith, 2005) or coping with the greater workload and time-management that the PBL process demands (Spronken-Smith, 2005; Yeung, Au-Yeung, Chiu, Mok, & Lai, 2003). Furthermore, Sleap and Reed (2006) question whether a stronger emphasis on employability skills can be achieved without having a detrimental effect on the amount of subject knowledge being studied.

Central to the PBL process and consequently the opportunity to experience and develop one's employability skills (e.g. communication in a group environment, teamwork, time-management) is brainstorming in which ideas and thoughts are collected both individually and by the group. One problem solving procedure that includes brainstorming is the Maastricht 7-steps strategy (Schmidt, 1983) in which students are encouraged to explain underlying mechanisms, processes or principles of phenomena described in a problem (Moust, van Berkel & Schmidt, 2005). Consequently, if students are not adept at brainstorming or in some cases it has actually been reported that students actually leave

the brainstorming stage out (Moust, van Berkel & Schmidt, 2005) then the facilitation of employability skills may not actually take place. This supports Joham and Clarke's (2012) proposal that some form of structure should be implemented which encourages group formation and subsequent brainstorming.

Scaffolding and the PBL process

Scaffolding can be traced to the social psychology of Vygotsky (1978) who introduced the idea of the "zone of proximal development" (ZPD), which is the difference between the learner's current level of expertise and the level beyond the learner's capabilities that may be achieved if supported by a more knowledgeable person (Wood Brunet & Ross, 1976). The facilitator's role during the scaffolding process is to support the learner in developing their knowledge and understanding of a particular subject, which eventually results in the beginner becoming autonomous in their learning (Meyer & Turner, 2002). For scaffolding to be effective within the framework of ZPD the learner and tutor must develop communication skills, mutual trust, respect and understanding that allows the learner and expert to operate more closely as a team (Yowell & Smylie, 1999). However, this is to assume that learner and the PBL facilitator are always together during the PBL process which is not always the case. For example, there are times when learners may work independently or with group members without the facilitator present. Consequently, some form of materialistic scaffolding may be necessary which supports the learner through what may be difficult times.

One study that investigated the effect of paper based worksheets as a scaffolding tool on Immunology students' learning achievement in a problem-based learning (PBL) environment was carried out by Choo, Rotgans, Yew, & Schmidt (2011). Worksheets were used for one day and completed by students during the self-study periods. "Each worksheet was made up of a series of questions and information designed to guide students to understand complex ideas as they work through it systematically." (p.520). Results from the study indicated that students perceived that the tutor was most influential to their learning, whilst the influence of the worksheet was rated the lowest. This seems to indicate that worksheets as a form of scaffolding did not enhance student learning within the PBL framework. However, on closer inspection of the methodology it seems that asking subject specific questions within the worksheet is not an effective form of

scaffolding, rather it is a questions and answers exercise, which only partially supports the learning process. We argue that to effectively scaffold the 'problem to solution' path any form of worksheet must encourage the learner to look at the problem from a number of different perspectives. For example, what information do we [as a group] currently have and what are the strengths and weaknesses of the solution?

This approach was adopted by Smith and Cook (2012) who implemented a scaffolding structure in to the brainstorming stage of the PBL process across all three levels of a sport and exercise psychology programme. Specifically the worksheet was developed based on De Bono's (1995) Six thinking Hats, which encourage the learner to look at possible solutions from a number of different perspectives. Student within this study used the worksheets in out of classroom brainstorming sessions, which were both individual and group driven, in preparation for a 'mini' viva which took place within the timetabled tutorial sessions. If a student did not prepare for the tutorial using the worksheet to brainstorm the problem, then they would not be in a position to provide the completed worksheet and consequently it was almost pointless attending. Although it seems from previous research that students may miss out the brainstorming stage (Moust, van Berkel & Schmidt, 2005) this was not the case, with attendance at the tutorials being recorded above 90% for the whole academic year, which subsequently allowed the development of employability skills to take place over time (Smith & Cook, 2012).

Student Perceptions of PBL

Student perceptions of PBL have been investigated by a number of researchers, with Smits, Verbeek, and de Buisonjé (2002), who conducted a review of medical education, proposing that PBL increased student satisfaction, while Lucas et al. (2006), who carried out a longitudinal study over 5 consecutive years reported that students were satisfied and accepted the PBL approach. Furthermore, Khaki et al. (2007) found that first year Iranian medical students were satisfied with PBL and believed that this method increased their problem solving abilities more than traditional teaching in gross anatomy. Whilst the afore mentioned studies have all investigated student perceptions of PBL within the medical profession there has also been similar research carried out in engineering. For example, Nagel et al. (2012) included work related skills in their PBL curriculum which encouraged students to engage with real-world settings from the engineering. It was argued that

cognitive skills such as problem-solving and different modes of thinking and learning would be developed which are critically important to this profession. Results indicated that the impact on employability prospects were extremely positive with students receiving internships from a number of high ranking employers, with some companies offering a second internship or in some cases employment.

The importance of developing graduate employability skills has also been investigated from the employer perspective with Archer (2010) interviewing a number of hotel Banqueting managers about the importance of work experience in developing employability skills when compared with skills developed whilst on a degree. The results indicated that the hotel managers perceived that the majority of skills learnt, in particular, communication, were developed whilst on a one year placement and were seen as more valuable than those learnt on a degree. Although the managers still recognised that some skills that are developed whilst on a degree program are still important in a graduate's employability. For example, Sleap and Reed (2006) who suggested that there is little feedback from recent graduates on the value of university experiences to their working life carried out retrospective interviews with recent physical education and sport science graduates and found that graduates reported that their university experiences had helped to develop many work based skills. Interestingly, graduates also proposed that additional work related skills (i.e. team communication, presentation skills, time management and arguing skills) should be included in the curriculum and suggested that small group work, work-related projects, debates and group presentations could be methods of developing these skills.

To investigate the relationship between student perceptions of satisfaction and importance of PBL in developing their employability skills, the present study introduced PBL in all three levels of a UK undergraduate Sport and Exercise Psychology Programme. The aim was to use a PBL approach to learning that provided multiple opportunities for students to develop their employability skills and it was hypothesised that student perceptions of their satisfaction with and the importance of PBL in developing their employability skills would change over time.

Method

Implementing PBL in to the Curriculum

Due to the lack of a control group this study adopted a quasi-experimental design. In total 108 participants took part in the study drawn from three levels of undergraduate study (37 first-year; 44 second-year; 27 third-year). The first-year students had one year, the second year students had two years and the third year students had three years experience of PBL. Students worked in groups of five or six on each problem, which lasted approximately four weeks and required students to attend timetabled group tutorial sessions facilitated by a tutor.   To maximise the facilitation of employability skills it is extremely important to deliver problems that are current and from the 'real-world' (Nagel et al. 2012) in which a sport psychologist would operate. To achieve this Savin-Baden's (2000:126) 'Mode 11 PBL for Professional Action' was used, which recommends the use of real-life situations that require an effective practical solution (See Table 1).

Table 1.   Mode II PBL for Professional Action

Knowledge	Practical and performative
Learning	The outcome-focused acquisition of knowledge and skills for the work place
Problem Scenario	Focused on real-life situation that requires an effective practical solution
Students	Pragmatists induced into professional cultures who can undertake practical action
Facilitator	A demonstrator of skills and a guide to 'best practice'
Assessment	The testing of skills and competencies for the work place supported by a body of knowledge

Importantly, to encourage and facilitate individual and group brainstorming sessions outside of class time by the students, a paper-based worksheet 'solution sheet' based on de Bono's (1995) Six Thinking hats was incorporated in to the PBL process for each problem. Each solution sheet had to be type written and handed in at the end of each problem and consisted of a group section where all the evidence from the group brainstorming was recorded and referenced in bullet point format. There is also an individual section where students used any information they felt relevant from the group section to write their own individual solution. After the individual solution section had been

completed the students had to record their reflections from a number of perspectives which are related to the Six Thinking Hats (see Smith and Cook 2012 for more detail on the scaffolding process).

Measuring Student Perceptions of PBL

For any student who does not like PBL there could possibly be an immediate negative perception of the relationship between PBL and the facilitation of employability skills. So consequently before investigating the relationship between PBL and employability skills it was initially important to gain an insight in to the students' general perceptions of PBL. To achieve this two YES/NO questions were asked.

1. Would you like to see more use made of this type of this learning?
2. Would you recommend this type of learning to others?

Students were then grouped according to their responses with those answering YES to both questions being categorised as the "LIKE" PBL group, while students who answered NO to both questions were categorised as the "DISLIKE" PBL group. Finally, students who answered a YES and a NO were categorised as the "UNSURE" of PBL group. In addition, students were asked to comment anonymously on, "What did you like about the PBL approach to learning?"

Measuring Student Perceptions of PBL in Relation to Facilitating their Employability Skills

To measure student perceptions of PBL in relation to facilitating their employability skills a self-report was used as this form of methodology is suitable when studying human characteristics (Howard, 1994). The National Student Survey (NSS) has been run by Ipsos MORI on behalf of the Higher Education Funding Council for England (HEFCE) since 2005 and asks undergraduates students to offer feedback on a number of aspects related to the course they are studying, with the final question asking students to rate their overall satisfaction with the course (NSS). As module evaluation at this institution from level one is based on the NSS format we argue that a large number of students in the present study are already familiar with the format of the NSS questionnaire, it was decided

that to achieve an accurate response a moderated version would be used as the basis for data collection. The moderated NSS (M-NSS) included seven employability skills (i.e. self-confidence, problem solving, critical ability, team-working, communication, practical skills and time-management) which had been previously identified as important in the workplace (Yorke, 2004; Sleap & Reed, 2006). However, we argue that although students may report being satisfied with aspects of their course, it is even more imperative to find out if students believe that the way they learn is important in developing their employability skills. For example, students may indicate that they are satisfied with some aspect of the course but do not feel that it will be relevant and important in the world of employment. Consequently, it was decided that an additional criteria would be added which asked to students to rate "*how important they felt PBL was in facilitating their employability skills."* At the end of the academic year students were asked to rate on a Likert scale their satisfaction of how the PBL experience had developed their employability skills (1 = very dissatisfied 5 = very satisfied) and the perceived importance to them of each employability skill (1= not at all important, 5 = very important).

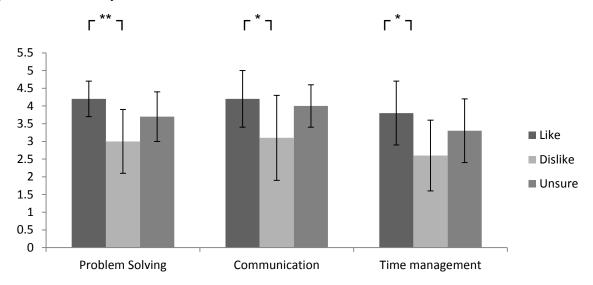### *Problem Delivery and Tutorial Procedure*

Due to class size students attended either a 20 minute (first and second-year) or 30 minute (third-year) tutorial facilitated by one of four experienced members of staff. Students pre-prepared individual subject related information for each tutorial session which was collected from the group brainstorming sessions and independent study. During the tutorials each student provided a verbal defence of why they thought the information was relevant to the problem scenario. A major requirement of the tutorial procedure was that no two students could bring the same information. This allowed members of the group to listen and understand another area different than their own and how the content related to the problem. It was during the pre-tutorial preparation and tutorial verbal defence where the employability skills were facilitated (see Table 2 in the Appendices for an account of the problem to solution process).

Results

Student Perceptions of the Relationship between PBL and Employability Skills

To simplify the results only significant differences will be discussed for both satisfaction and importance between the groups who LIKED, DISLIKED who were UNSURE of PBL facilitating their employability skills.

Figure1.   First year M-NSS Satisfaction Scores

Data in Figure 1 is shown as mean ±SD (* *P*<0.05, ** *P*<0.01). There are 18 participants in the Like group, 6 participants in the Dislike group and 13 Participants in the Unsure group (n=37). A one-way ANOVA revealed significant differences in Satisfaction ratings between the LIKED and DISLIKED groups in problem solving (F(2, 34) = 7.61, p<0.01), communication (F(2, 34) = 4.21, p<0.05) and time management (F(2, 34) = 3.92, p<0.05, See Fig 1). Post-hoc Tukey's HSD tests found that the LIKED group were significantly more satisfied that PBL improved their problem solving (p<0.01), communication (p<0.05) and time management (p<0.05) skills than the DISLIKED group.
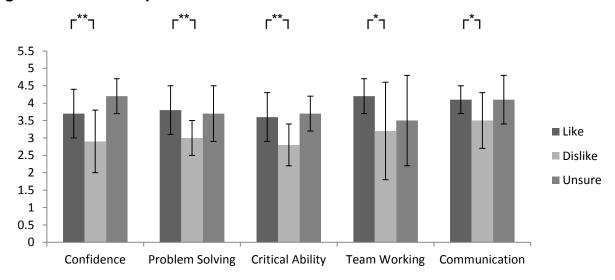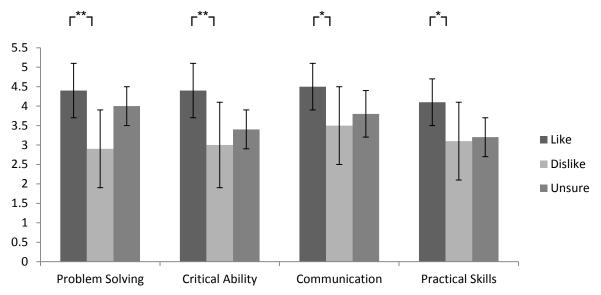
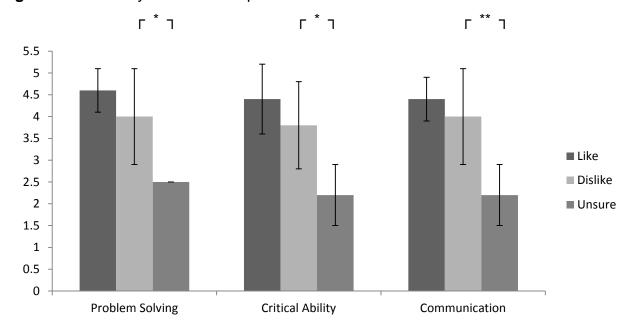**Figure 2***.*   Second year M-NSS Satisfaction Scores

Data in Figure 2 is shown as mean ±SD (* *P*<0.05, ** *P*<0.01). There are 25 participants in the Like group, 12 participants in the Dislike group and 7 Participants in the Unsure group (n=44). A one-way ANOVA revealed significant differences in Satisfaction ratings between the LIKED and DISLIKED groups in confidence ($F_{(2, 41)} = 8.11$, $p<0.01$), problem solving ($F_{(2, 41)} = 6.27$, $p<0.01$), critical ability ($F_{(2, 41)} = 7.23$, $p<0.01$), team working ($F_{(2, 41)} = 5.22$, $p<0.05$) and communication ($F_{(2, 41)} = 4.47$, $p<0.05$). Post-hoc Tukey's HSD tests found that students who LIKED PBL were significantly more satisfied that PBL improved their confidence, ($p<0.01$), problem solving ($p<0.01$), critical ability ($p<0.01$), team working ($p<0.05$) and communication ($p<0.05$) skills than those who DISLIKED PBL.

Figure 3.   Second year M-NSS Importance Scores

Data in Figure 3 is shown as mean ±SD (* $P<0.05$, ** $P<0.01$). There are 25 participants in the Like group, 12 participants in the Dislike group and 7 Participants in the Unsure group (n=44). A one-way ANOVA revealed significant differences between the LIKED and DISLIKED groups in problem solving ($F(2, 41) = 7.56$, $p<0.01$), critical ability ($F(2, 41) = 8.19$, $p<0.01$), communication ($F(2, 41) = 4.21$, $p<0.05$) and practical skills ($F(2, 41) = 4.14$, $p<0.05$). Post hoc Tukey's HSD tests found that the LIKED group perceived PBL as significantly more important to their problem solving ($p<0.01$), critical ability ($p<0.01$), communication ($p<0.05$) and practical ($p<0.05$) skills than the DISLIKED group.

Figure 4.   Third year M-NSS Importance Scores

Data in Figure 4 is shown as mean ±SD (* *P*<0.05, ** *P*<0.01). There are 15 participants in the Like group, 8 participants in the Dislike group and 4 Participants in the Unsure group (n=27). A one-way ANOVA revealed significant differences between the LIKED and DISLIKED groups in problem solving ($F(2, 24) = 4.61$, $p<0.05$), critical ability ($F(2, 24) = 5.01$, $p<0.05$), communication ($F(2, 24) = 5.73$, $p<0.01$, see Fig 4). Tukey's HSD tests found that the LIKED group perceived PBL as significantly more important to their problem solving ($p<0.05$), critical ability ($p<0.05$) and communication ($p<0.01$) skills than those who DISLIKED PBL.

Preliminary Discussion

Student Perceptions of Satisfaction

Statistical analysis found that first-year students in the LIKED PBL group were significantly more satisfied with PBL improving their problem solving, communication and time management skills than the DISLIKE PBL group. Difficulties with problem solving are expected in the first year. For some students the PBL process will be new to them so initially some may not fully understand it (Savin-Baden, 2000). However, when looking at the anonymous comments, it is evident that regardless of the preference for PBL, all groups are aware of the advantages of this approach. For example, "*Team work, solving problems" (L1-30)*; "*A chance to learn from others in your group" (D1-10)*; "*Team work" (U1-7*) were all cited as elements of the PBL approach that students liked. Communication is also an area in which students may need time to develop. When students first come to university initially it may be difficult to make friends. Interestingly, the DISLIKE group still rated communication 3 out 5 which suggests that they were communicating with other students on the module. With one student from the DISLIKE group writing "*A chance to learn from others in your group" (D1-10)*. Initially when students first arrive at university they are faced with an overwhelming number of things to do and although some first-year students found PBL helped to develop their time-management skills more than others, there were significant differences between the groups and no individual student reported anonymously that PBL helped their time-management.

For second-year student's statistical analyses indicated that the LIKED PBL group were significantly more satisfied with PBL improving their confidence, problem solving, critical ability, team-working and communication skills than the DISLIKED PBL group. However, one student in the DISLIKE group did report that communication and team-working was taking place by writing "*The interactions with other learners meant that lots of information could be gathered from a variety of sources" (D2-35).* While a student in the LIKE group indicated that several employability skills are being facilitated by writing "*It enables you to build on your team working skills, improving communication, organization and time keeping skills "(L2-25).*

Student Perceptions of Importance

There were no significant differences for any Importance categories at first-year. At second-year there were significant differences between the LIKE and DISLIKE groups for problem solving, critical ability, communication and practical skills. Although the DISLIKE group ratings suggest they do not like PBL the students still recognise the benefits in developing their employability skills by reporting in the anonymous comments that they liked PBL because it; "*Improved communication" (D2-22)* allowed them to "*Finding info for myself helped me to learn" (D2-44)* and benefit from "*The interactions with other learners meant that lots of information could be gathered from a variety of sources" (D2-35.)*
At third-year there were significant differences for importance between the LIKE and UNSURE groups which may be caused by the extremely high ratings which the LIKE group (all over 4.2 out of 5) gave to problem solving critical ability and communication. A very important point here is that although in all levels some students disliked or were unsure they still recognised the importance of PBL in developing their employability skills. This is indicated in the anonymous comments in which all groups report a number of different benefits of the PBL approach, some of which are more general in context while others are related to employability (see Table 2 for a full list of all the comments from each level).

Discussion

This study has added to the extant literature on the utility of PBL in enhancing employability skills (Joham & Clarke, 2012; Nagal et al, 2012; Yorke, 2004) by clearly demonstrating that regardless of whether students like, dislike or are unsure about the practice of PBL, they overwhelmingly perceive that the PBL process facilitates their employability skills. The present study hypothesised that student perceptions of their satisfaction with and how important they felt PBL was in developing their employability skills would change over time. This is clearly supported by the fact that at first-year there are significant differences between the groups for satisfaction but not for importance, while at third-year the opposite is true. The change in student perception over time suggests that it is important to implement PBL from the first year of study so that students get used to PBL (Savin-Baden, 2000) and so that students explicitly make a connection between the way that they are taught and their future employment.

The results of the present study also indicate that students who liked PBL would provide higher satisfaction and importance ratings than those who did not like or were unsure of PBL. Whilst this result is not surprising it was supported at all three levels; with the LIKE PBL group often reporting scores of ~4 out of 5 for each of the satisfaction categories whilst providing 35 anonymous comments indicating they 'liked' PBL. Whereas the DISLIKE and UNSURE groups only provided 9 and 12 responses respectively, which may have indicated that they were dissatisfied? Although the majority of students in this study liked the PBL approach it is important to note that the standard deviation values in Figure 4 for the Third year Unsure group are high indicating that although people responded in a particular way (e.g. Liked, Disliked, Unsure) there was still a spread of responses across the sample overall. Consequently, future research should investigate alternative student-centred approaches to learning to ensure that a higher number of students are satisfied and feel that the way they are being taught is important in developing their employability skills.

Also, it is unclear from the anonymous comments whether or not students perceived the PBL approach as important in facilitating their employability skills and therefore further investigation is required. The results of this research clearly support the findings from the Sleap and Reed (2006) study in which students suggested that small group work and the

inclusion of different employability skills in to the everyday curriculum are necessary to develop work related skills. However PBL has not always emerged favourably in facilitating employability skills through the eyes of the employer when compared to a traditionally taught student Beachey (2007). This is contrast to the study by Smith and Cook (2012) who found that when compared to lecture-based delivery, PBL was far superior in increasing attendance and academic performance, when measure by module mark. However, on close inspection Beachey readily admits that "the 2 PBL programs differed somewhat in the extent to which PBL strategies were employed" (p.1499), consequently, it is difficult to compare Beachey's work with the present study. Therefore, there is a need for future research to gain a more accurate account of graduate and employer perceptions of PBL by comparing a PBL only cohort with a traditionally taught only cohort.

No study is without its limitations and it is clear to see in the anonymous comments students are reporting on only the PBL process itself and any explicit link to employability is made by the researchers themselves. It is essential that future research investigates student perceptions of the way they are taught and the facilitation of their employability skills more clearly, alongside with what potential employers' perceptions of the skills an employee should possess, as it has been reported previously that work experience is more effective in developing workplace employability skills than the skills learned during a degree program (Archer, 2010).   In addition, although there are several claims made in this study for the positive relationship between the way a student is taught and the facilitation of employability skills, it is just that, a claim, some of which is supported by quantitative and qualitative evidence. It may be that in the protected environment of the institutional classroom students feel comfortable communicating to their fellow students and consequently developing their team-working and problem-solving skills. However, if the findings from this study are of any worth they must demonstrate that the employability skills learned whilst in an educational institution are successfully transferable to the real-world of employment. This line of enquiry is for future research to investigate and one method may be to compare interview responses from work experience students who are taught by PBL and their placement providers.

Conclusion

The results of this study fully support the implementation of a student-centred curriculum that has the ability to facilitate employability skills. For a number of academics this may mean a move away from the traditional approach to teaching and learning, where the students remain passive listeners (Beachey, 2007; Isseks, 2011) to an interactive student-centred PBL curriculum. It is now evident that given the current economic climate subject knowledge alone may not be enough to secure a job (Davies, 2009; Nagel et al, 2012; Wilson, 2012; Yorke, 2004). Furthermore, with an increasing number of graduates employed in a job that has no resemblance to the subject area that they studied (ONS, 2012) higher education must immediately implement flexible and sustainable changes (Sterling, 2008) to the curriculum that are capable of moving with the rapidly changing world of employment.

Acknowledgements

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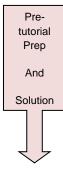
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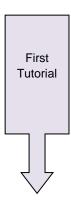
Appendix 1

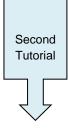*Table 2:* The 'problem to solution' process

Week 1

- Introductory two hour lecture where each problem was introduced to the whole class
- Each individual tutorial group have the opportunity to see problems that other groups are presented with
- The first session (Problem 1) for first-year also contained background information on problem-based learning and tutorial requirements
- Students must download a blank solution sheet from Moodle which has to be completed during the problem solving process
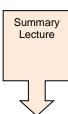
Pre-tutorial Prep And Solution

- Students meet outside of class time to brainstorm the problem and agree group and individual roles and goals
- Each student's contribution must be unique and recorded on the solution sheet
- A minimum of one week and sometimes two weeks to do this
- The 'Group Solution' section contains information from each member of the group - students email this information to each other
- The individual solution at the end of the solution sheet, must contain content from the group solution section (For a more in-depth account of the solution sheets see Smith & Cook 2012)

First Tutorial

- Each student has approximately five minutes to defend their individual contribution on how it is related to the problem
- When required the facilitator would prompt to gain a deeper understanding and to challenge the theoretical argument and summarise the main points
- Once leaving the tutorial students would meet again outside of class time to discuss the problem and agree 'new' group and individual roles and goals, based on the feedback from the tutor in the tutorial.
- To develop practical understanding students also attend a lab class which is in the area of the problem

Second Tutorial

- The format of this tutorial mirrors the initial procedure of tutorial 1
- However, additional information gathered by each student is verbally defended and marked by the tutor/facilitator
- The solution sheet is type written and handed in at the end of the final tutorial
- Each solution sheet is marked and written feedback is provided handed back to the student before the next problem is given out

Summary Lecture

- At the end of each problem a two hour lecture is delivered which provides a summary of the main theoretical and scientific information related to the problem and consequently solution
- Students see other groups solution
- The next problem is given out to the student (in a different area of sport psychology) and the process above is repeated

Appendix 2. What did you like about the PBL approach to learning?

	LIKE	DISLIKE	UNSURE
LEVEL 1	*More knowledge and opinions could be put together to provide an appropriate solution (L1-3)* *Developing own skills applied to life skills (L1-5)* *It helps improve team working skills. Increase confidence and communication skills (L1-8)* *Done at your own pace. Everyone brings something different to the table (L1-9)* *Was in my hands, my answers, my arguments etc (L1-21)* *How there is no wrong answer (L1-24)* *Each student can put their own stamp on the answer (L1-29)* *Team work, solving problems (L1-30)* *More interactive (L1-31)* *Makes you take responsibility to research evidence than being spoon fed in lectures (L1-34)* *Different to previous learning experience, new, efficient, structured format, work easier, production of work is better due to team working (L1-35)*	*A chance to learn from others in your group (D1-10)* *Working in a group(D1-11)*	*Team work (U1-7)* *Working in a group (U1-11)* *Means you have to go and find out information for yourself. So take it in better (U1-20)* *Nicer than lectures (U1-32)* *The problems (U1-33)*
LEVEL 2	*Gives you the freedom to research around the topic area (L2-6)* *How it got us to work in groups and the realistic environment it created (L2-7)* *Problem solving process helps you to understand and learn the key points of the different subjects and how to apply it to sporting environment (L2-11)* *I found that it made me use my research skills to find relevant info to the problems that I was interested in. they also allow a much larger amount of information to be found (L2-13)* *Own research to solve problems, relative to sport problems (L2-14)* *More serious time spent with lecturers where direct questions and answers can be given regularly (L2-15)* *You take more information in when learning for yourself and finding info for yourself (L2-16)* *I like the fact that I could work with others and discuss my work with them without being left to do all the work on my own (L2-19)* *Good to work within a group as learned to communicate*	*Loads of research obtained (D2-8)* *Improved communication (D2-22)* *The interactions with other learners meant that lots of information could be gathered from a variety of sources (D2-35)* *Finding info for myself helped me to learn (D2-44)*	*It applies the information available in to a situation where you can self learn and solve the problem so you have a better understanding unlike if you are told what to do then you won't learn as much (U2-2)* *For group work (U2-3)* *Helps me to think about solutions to problems and makes me actual learn. I learn better this way, unless I do not*

	and work effectively. Allows you to focus on a particular area, so that you can understand that area really well (L2-23) *It enables you to build on your team working skills, improving communication, organization and time keeping skills (L2-25)* *The opportunity to have small group or one to one sessions with teacher (tutorials) (L2-27)* *Less lecture based (L2-30)* *Improves communication and you go out of your comfort zone and get the info yourself (L2-36)* *Laid back, tutors are approachable, feedback was always provided and very useful (L2-38)* *Allowed advanced learning skills to develop (L2-39)* *Self-learning – go away and find the info for yourself. I find I learn better this way (L2-40)* *It was interesting and relevant to current issues in the sporting world today (L2-42)* *Can communicate directly with tutors and help with other members of the groups is useful for learning (L2-43)*		*understand info (U2-5)* *Allows freedom to go away and do your own study (U2-12)* *Was able to find info for ourselves instead of just having lectures. Good for those entering this year to integrate with other members of the group (U2-31)*
LEVEL 3	*Variety of topics (L3-7)* *Different approach (L3-9)* *Individual study (L3-16)* *It's quality (L3-21)* *Lets you find your own information so you understand it more (L3-22)* *Got you to do your own work (L3-26)*	*Good for meeting other people (D3-18)* *Smaller groups (D3-24)*	*Good communication (U3-14)*