Using groupwork in the designing and playing of board games in occupational health and safety

Penny Singh[1] and Ivan Niranjan[2]

Abstract: *In order to ensure the safety and health of workers, Occupational Health and Safety practitioners must have an excellent understanding of the Occupational Health and Safety Act and Regulations. They must therefore be able to interpret statutes and legislation which ensure that all sorts of work activities are carried out safely and with minimal risk. The aim of this study was to determine the effectiveness of the designing and playing of the board games as an educational intervention in Occupational Health and Safety within a groupwork context in a diverse classroom at a tertiary institution in South Africa, and report on students' reflections of the process. Using groupwork, the boardgame exercise proved to be an effective teaching methodology and deep learning was achieved by designing, playing, and being assessed on the games. The use of groupwork also promoted improved relations and interactions, and effective teamwork. Valuable lessons in communication, collaboration and conflict resolution were also learned.*

Keywords: *board games; communication; education; groupwork; learning; occupational health and safety; students; teamwork*

1. Professor and Research Co-Ordinator, Accounting and Informatics Durban University of Technology
2. Lecturer, Environmental Health, Department of Community Health Studies, Durban University of Technology

Address for correspondence: *Professor Penny Singh, Accounting and Informatics Research Office, Durban University of Technology, Durban, South Africa. pennysin@dut.ac.za.*
Ivan Niranjan, Environmental Health, Department of Community Health Studies, Durban University of Technology, Durban, South Africa. ivann@dut.ac.za

Introduction

> Safety and health of workers is part and parcel of human security. Safe work is not only sound economic policy; it is a basic human right (The National Occupational Health and Safety Policy, 2003, p.2).

Occupational Health and Safety practitioners by the very nature of their occupations are intrinsically involved with the safety and health of workers. In order to execute their duties they need to have an excellent understanding of the Occupational Health and Safety Act (OHS Act) and Regulations. They must therefore be able to interpret statutes and legislation which ensure that all sorts of work activities are carried out safely and with minimum risk.

In South Africa, the Occupational Health and Safety (OHS) Act (Act 85 of 1993) has been in effect from 2003 to date, but all the jargon used in the legislation makes understanding and interpretation, and therefore implementation of the Act difficult. This paper documents an educational intervention to address this problem, by using groupwork to devise board games to develop students' knowledge, understanding and interpretation of the OHS Act and selected regulations pertaining to health and hygiene, because as Kambouri et al (2006) said, games are an acceptable learning approach in an otherwise rather unimaginative curriculum world. McFarlane et al (2002) add that games provide a forum in which learning arises as a result of simulated tasks, knowledge is developed through the content of the game, and skills are developed as a result of playing the game. Studies by Bottino and Ott, (2006); Good and Robertson, (2004) and Kafai, (2006) among others explored the importance of making games rather than merely playing them. They found that the greatest benefit remains for the designers of the game as they are involved in the discussions in developing valid instructional game ideas, design and strategies, and they develop new ways of thinking (Kafai, 2006).

Taking all of the above into account, this educational intervention required groups of students to design a board game and then play the games (designed by others in the class) in an attempt to foster deep learning. Head (2008) explains that deep learning occurs when students internally comprehend information differently after the learning process and where the learning experience leads to conceptual changes in the students' minds.

In order to achieve deep learning groupwork was used as the authors are familiar with the benefits of working within a group context. Our students come from very diverse home, language, socio-economic and cultural backgrounds and our classrooms are multicultural and multilingual in their make up. Like all educational institutions in South Africa, we employ English as the medium of instruction, as a result of which the majority of our students are second or foreign language speakers of English. This poses many challenges for students who do not speak English as a first language. Having used groupwork in different contexts to benefit English second language students before, we are familiar with the benefits that it provides especially within multicultural and multilingual classrooms.

Aim and Objectives

The aim of this study was to determine the effectiveness of the designing and playing of the board games as an educational intervention in OHS within a groupwork context, and report on students' reflections of the process. To achieve this aim, the following objectives were addressed:

- to assess students' knowledge of the OHS Act and Regulations before designing and playing the board games;
- to assess students' interpretation, application skills and knowledge of the OHS Act and Regulations after designing and playing the board games;
- to determine students' perception of the effectiveness of the use of board games as an educational intervention; and
- to determine the effect of the designing and playing of the board games on group dynamics, namely, the development of interpersonal skills and relationships among team members.

A pre-test and post-test were respectively employed to achieve the first two objectives and a questionnaire was used for the achievement of the third and fourth objectives (the quantitative data collection instruments used are discussed in the methodology section).

Groupwork

We concur with Taylor's (1996) experience of the value of learning in groups (in Clapton and Daly, 2007, p.62), namely, that learning in groups recognizes and validates the skills, knowledge and ability held by all the students and acknowledges the mutual benefits that arise from sharing these. Singh (2007) and Clapton and Daly (2007) also found that relationships between students are deepened with groupwork. This was an important outcome for us as our students by virtue of their diversity often do associate with their peers who are different from them. As Singh (2010) said, although institutions of learning are painfully aware of the racial, cultural and ethnic divides on their campuses, no real strategies or policies have been put into place to ensure integration. She adds that with people always trying to be politically correct, issues of race, culture and diversity are not openly declared or discussed, and people are just expected to get along. It was therefore hoped that groupwork would enable closer relationships between the students, while stimulating learning.

Boardgames vs computer games

The European Leisure Software Publishers Association (2006), Williamson (2007), Gee (2003), Young and Upitis (1999) and Dempsey et al (2002) among others suggest that computer games offer the potential for learners to enjoy fully personalized learning experiences and opportunities for personal growth. We acknowledge the perceived benefits of computer games for teaching and learning, but as access to computers are very limited at our institution, and many of our students do not have personal computers at home, we decided to use board games so that students could work on and use the games outside the classroom as well. Also, Holmes (2011) noted that computer based games rarely incorporate the key feature of competition which he describes as the mark of a 'true' game.

Theoretical framework

Roth (1994, p.198), Killen (2000) and Cohen, Manion and Morrison (2006, p.108) among others concur that learning is an interpretive process as new information is given meaning in terms of students' prior knowledge, which means that each learner actively constructs and reconstructs his or her understanding rather than receiving it from a more authoritative source such as a teacher or a textbook. By implication then, the 'world' of the learner constitutes prior knowledge, experiences and beliefs which have been shaped by their home, cultural, educational and social backgrounds (Singh, 2004).

McRobbie and Tobin (1997), and Rodriguez and Berryman (2002) agree that although learning environments are necessarily personal, each individual's constructions are mediated by the actions of others in a social setting and characteristics of the culture in which learning is situated. Social constructivism thus proposes that collectives of persons are capable of actions and understandings that transcend the capabilities of the individuals on their own (Davis, Sumara and Luce-Kapler, 2000, p. 68). In explaining Vygotsky's 'zone of proximal development', Moll (1993, p. 3) emphasized that what children can perform collaboratively or with assistance today they can perform independently and competently tomorrow (*see also* Vygotsky, 1962, 1978, 1981).

Pahl and Roswell (2005) and Cohen et al (2006) suggest that learning should be a search for meaning, self-directed, and active. Kane (2004, p. 277), Becker and Glasscoff (2005), Levy and Merenstein (2005), O'Sullivan and Cooper (2003), Sivan, Leung, Woon and Kember (2000) among others add that active learning engages learners in a variety of open ended activities, and seeks to encourage independent, critical thinking in learners, fosters a deep approach to learning, and encourages them to take responsibility for what they learn.

Games are entertaining and engaging, they promote problem-solving and decision-making through enjoyable physical activity (Wright and Forrest, 2007) allowing players to construct their own understanding and learn in a natural unobtrusive manner (Dormann and Biddle, 2006). Constructing or making games in a group also provides great scope for social interaction and communication thus allowing students to construct new relationships with knowledge in the process (Kafai, 2006; De Freitas and Griffiths, 2008).

Within a social constructivist framework then, this education intervention used an active learning approach within groupwork to develop students' knowledge and understanding of the OHS Act and Regulations.

The educational intervention

The students had one month to design a game which would teach the OHS Act and Regulations. Card, boards and materials such as paint and glue were provided to the students. The assessment criteria which was based on the guidelines was carefully explained to the class.

Specific guidelines were laid out for the design of the games as follows:

- Design a playing board, that is: a square, rectangle, hexagon, pentagon, etc.
- Using a theme or topic (eg. lead, asbestos, etc.) place appropriate clip art, digital images, pictures, photographs, etc. on the board
- Formulate at least 25 questions and place each question on a separate card. Correspond the colour of the card to the colour on the board
- Decide on playing instruments, eg. beads, tiny ornaments, etc.
- Use a starter, eg. dice, spinner, etc.
- Give the game a suitable and appropriate name
- Formulate the rules of the game, and indicate clearly the steps to be followed. Ensure that the rules and the steps are very simple and easy to follow.
- Make the game fun. Insert items such as: earn bonus points, go back to the beginning, miss a turn, go back three squares, move forward three squares, etc.

After designing the games, the next step was for the class to play the various games. This was done over one week to allow each student to play all the games. The total duration of the educational intervention (including designing and playing the games) was two months, followed by analysis of data and write-up of the results.

Methodology

This educational intervention was an evaluation study as it was concerned with the assessment of the design and effectiveness of the board games.

Data Collection Instruments

Pre-and post-tests were conducted to assess the learning gained from the process. Quantitative research in the form of a questionnaire was used to gather student reflections on the process as part of the evaluation.

The purpose of the pre-test was to determine students' knowledge of the Occupational Health and Safety Act (Act 85 of 1993) prior to them designing and playing the board games. The post-test was used to determine the effectiveness of board games in teaching students the OHS Act. Both tests contained five sections. The first section focused on biographical details and contained questions on age and gender. The second section which was informed by the OHS Act, dealt with interpretation, application skills and knowledge of the fifty sections of the Act. The last three sections pertained to regulations on asbestos, lead, and hazardous chemical substances. Two hours each were allocated to the tests as they comprehensively tested knowledge of the OHS Act. The purpose of the detailed tests was also to reinforce knowledge of the Act.

The questionnaire was administered after the post-test. As students were not asked to identify themselves on the questionnaire, and because the authors wanted to cross tabulate information from the post-test with responses on the questionnaire, it was necessary to ask for some biographical details. Granted, the authors could have used a numbering or coding system to link the questionnaire and the post-test, but they did not want to ethically compromise the anonymity of the students. The second part of the questionnaire focused on the effectiveness of the use of the board games as a teaching tool. The third section focused on group dynamics, namely, the development of interpersonal skills and relationships with team members.

After the post-test, the questionnaire was administered to each student which they had to complete and deposit in a specially marked box outside one of the author's office. This was done to ensure anonymity.

A total of 41 questionnaires were returned. All the questionnaires were deemed usable. The responses were then coded and analysed using version 18.0 of the Statistical Package for Social Scientists (SPSS).

The Sample

The population was third year Environmental Health students at the Durban University of Technology. Purposive sampling was used to select the sample because as Trochim (1996) explains, purposive sampling is used when we have one or more specific predefined groups that we are seeking. He adds that the advantage of purposive sampling lies in the selection of knowledgeable participants who are able to provide the required data for the research. The sample for this educational intervention was selected on the basis that they could provide the desired information (Sekaran, 2003) and on the researchers' knowledge of the population, its elements, and the purpose of the study (Babbie, 2004; Emory and Cooper, 1991; Jancowicz, 1995). The authors thus selected a full class and had 100% participation, that is, a total of 41 students. It must be noted that the authors did not select students to form a class; instead, a full class was selected, in other words, they did not have any say regarding the composition of the class. The reason for selecting this class was that they had studied the Occupational Health and Safety Act (Act 85 of 1993) in depth as part of the course in Occupational Health and Safety 3. They had studied the fifty sections of the Act and the three sets of regulations on asbestos, lead, and hazardous chemical substances. They were therefore deemed to have the necessary grounding or background knowledge required for this study.

As was the case with all third year classes in the program, this class was diverse in terms of language proficiency, culture, home background, and race. All students in the sample were between 19 and 22 years of age. The fact that the sample was made up of 73% female and 27% male was not within the authors' control. This was due to the department targeting female students during registration at the beginning of the year in an attempt to address the domination of the OHS sector in industry by males, and because of the transformation agenda in the country which demands gender equity in OHS. African students made up 68% of the sample, 27% were Indian and 5% were White. This educational intervention was conducted in Durban which is a town

in the province of KwaZulu-Natal. Geographically, Durban has the highest concentration of Indian people in South Africa, but the majority of its population is African. It is interesting to note that this sample seemingly did not contain any Coloured students but closer examination of the statistics revealed that there were in fact Coloured students in the class but they chose to classify themselves differently. Given that transformation efforts in the country favour Africans (Accountancy SA, 2012), many students choose to classify themselves this way to their benefit (The Economist, 2010).

Grouping the students

The group of 41 was divided into seven groups of five students each, with one group of six. Students were tasked with choosing their own groups, with two conditions: each group had to incorporate males and females, and students from different race or ethnic backgrounds. This was to ensure a mix of students in each group. As there were only 2 white and 11 Indian students in the class, students were informed that they had to compose their groups firstly in terms of race (as equitably as possible), and then in terms of ethnicity.

Students had to assign task-related roles to each member of the group. Roles were therefore not prescribed to them, rather they were allowed to make their own decisions based on needs within the group. They could decide on whether they wanted a group leader/s or not, and whether this would be on a rotational basis or not.

Students were also told that they should resolve conflicts within their groups, failing which they could present their case to the class at the weekly two hour session which was set aside for discussion of progress. If they chose to present their conflict to the class, they first had to seek permission from the authors who were wary of students taking up the class' time to discuss issues that could be easily resolved among themselves. As such, they had to provide a detailed summary of what they had done in attempting to resolve the conflict. Granted, it was harsh to ask students to air their grievances to the whole class, but this was done to further teach communication skills.

Cases presented included the following. The composition of some of the groups proved problematic. Some students raised issues such as 'bullying in the group', other students felt they were more 'capable', 'more

articulate' or 'could speak English better' and wanted to 'dominate' the project. Others felt 'overwhelmed' as they were 'forced to do extra work' by 'others in the group' because 'I have a computer at home', 'I speak English well', 'I live near campus', or 'I am a female'. Discussions and deliberations regarding the above cases led to deeper insights regarding gender roles, race relations and power issues.

One group sought the authors' intervention as two of their members were not attending classes regularly. On examination of the evidence, the two students were cautioned that non attendance would result in them being dismissed from the group and that they would not be able to participate without being part of a bigger group. Mindful of the consequence, they started attending classes regularly.

Findings

Evaluation findings and intervention outcomes

At first, the findings from the pre-and-post-tests were disappointing. After playing the OHS games, the following findings were noted:

- respondents' knowledge of the OHS Act improved significantly by 14%, application proficiency improved by 6% only.
- respondents' knowledge in the specific area of asbestos was marginally enhanced by only 5%, application proficiency improved by an insignificant 1% only.
- respondents' knowledge in the specific area of lead improved by 2%, and application proficiency improved by a significant 10%.

The purpose of the board games was to increase the skills, knowledge and perceived effectiveness of the teaching methodology. After the games, which should only have added to the cumulative effect of the various matters, the learners indicated no significant increase in knowledge levels and insignificant increase and in fact in the case of one specific area, a decrease in application proficiency. The findings indicated that there was no significant improvement in knowledge nor application in the specific area of hazardous chemical substances, in fact, their knowledge and application skills declined by 9% and 5%

respectively after exposure to the games. This cannot be possible, as cumulative knowledge should not decrease. The results of the pre-tests were thus examined to determine if they could have had an effect on the results of the post-tests.

It was found that the pre-test had a 'negative' effect on the outcome of the post-test results as students had overestimated their knowledge of the OHS Act and Regulations. When correlated with the results of the post-test therefore, it appeared as if there was a decrease or decline in their knowledge.

During and after performing the post-test, students gave the impression that the educational intervention made them realize their shortcomings regarding their understanding of the OHS Act and Regulations. The fact that the post-test assessed students' interpretation, application skills and knowledge of the fifty sections of the Act made them realize that although they knew the different sections, they needed to understand, interpret and apply the sections of Act rather than just rote learn them. The post-test was designed to test as well as reinforce their knowledge, but it also afforded students an opportunity to reflect on their own learning and to critically assess themselves. One explanation of the unexpected findings could therefore be that students acquired a more realistic view of their cumulative knowledge and skills during the post-test.

Student reflections on the process: questionnaire analysis

Students felt the games exercise was an effective learning experience in that it: improved their confidence in applying the OHS Act (87%); was learning through fun (21%); created a relaxed learning environment (56%); enhanced their understanding of the OHS Act (19%); encouraged active participation and was personally stimulating (29%). As Killen (2000, p.19) said, learning comes alive for learners when it comes through experiences they find meaningful and valuable (*see also* Killen, 1998, 2001).

The students enjoyed the social aspects of the groupwork exercise (98%). They indicated that the designing and construction phase of the games helped to develop interpersonal skills and promoted relationships with peers they otherwise do not communicate with. They added that with the conventional teaching this is not promoted, as they do not get

opportunities to interact with each other on such a prolonged basis, in a setting where they can discuss, design and construct teaching material together. They reported that they derived benefit in terms of respect for others (41%), greater self awareness (26%), ability to participate or work in a team (92.7%), self improvement (17%), and the ability to keep to deadlines (56%). 14% each indicated that the games exercise entailed a lot of hard work, but that it enabled them to learn from their peers and the group interactions. Roth (1994, p.216) noted that as learners pursue questions of their own interest, they not only learn to gain pleasure from inquiry, they also gain ownership over problems and solutions (*see also* Lave, 1988, p.69; Boud, 2007).

In responding to the question: overall, what did you find most beneficial from the games exercise, respondents were unanimous that learning was the most significant benefit. They said that they had to: 'have good knowledge of the Act in order to develop the games', 'learn all the sections of the Act in order to play the games', that they 'had to learn the same thing over and over again' which 'reinforced learning', the games thus motivated them to 'learn harder and do better', and to 'learn to understand so you can do better than the others'. Greer (2001) explains that students develop an approach to learning determined by what is expected of them. The competitive nature of the games motivated them to learn with understanding instead of just memorizing their work.

Given South Africa's separatist past, responses to the question: how did the games exercise develop your interpersonal skills, was particularly heartening. Responses included: 'we had to be more tolerant of each other', 'we discovered each other's skills', 'we got to know each other better', 'we communicated with each other', 'we developed respect and trust for each other', and 'we worked together to keep deadlines and as such we had to depend on each other'. Students admitted that prior to this exercise, they rarely spoke to each other as they communicated only with the people they knew, but this exercise 'forced' them to interact with other people in their class. They also said, that working in groups on the construction of the games helped them to 'work together', 'to see things from each others' perspective', 'to compromise', 'to be a good listener', 'to deal with different personalities', 'to work with different kinds of people', and 'the value of being a team player'.

Limitations of the study

While the students hailed the educational intervention as being of 'great benefit', the authors acknowledge the limitations of this study which, if addressed, could have yielded richer data. The absence of a control group meant that results were not comparable. This control group could have served as a comparison group as they would have focused on the same content without using the game making and playing approach. Results of the pre-and-post tests could then be compared with those of the intervention class. The authors accept that as it stands, this educational intervention falls into the category of a single case evaluation study with limitations for generalization. A further impediment to generalization lay in the sample. Bearing in mind that the make up of the class was beyond the authors' control, the inclusion of a more representative sample in terms of race and gender would have further enabled generalization.

Regarding the explanation for the pre-and-post test results, retrospective measures could have been included in the post-test to address any overestimation in the pre-test, for example: questions such as, 'now that I think about it, I would rate my competence in this area as … '.

The authors therefore suggest that the above be borne in mind if this study is to be performed or adopted in the future.

Conclusion

From the results of the questionnaire, it may be concluded that the games exercise aided in creating a favourable learning environment as the students learned from: the construction of the games; playing the games; and their interactions with each other. It was definitely an effective learning experience, not only in terms of the OHS Act and Regulations, but also in terms of interpersonal skills and in fostering relationships among peers, essential in the workplace.

Groupwork encouraged students to: interact with, depend on, and learn from each other. They learned to share resources and work as members of a team. Granted, there were problems and conflicts among members but as they were told that they would have to first sort out

problems among themselves, students learned effective skills in conflict resolution. The presentation of conflicts to the class reinforced skills in conflict resolution and communication.

Playing the games meant learning in a fun way while interacting with each other. The issue of language difference melted away as they worked together to design their games. As they were each involved in the design of a game, the competition that playing the game fostered, forced them to see each other as equals, something that they ordinarily did not do. Deep learning was achieved not only about the OHS Act and Regulations, but also about each other.

The games exercise was also found to be an effective teaching methodology as it increased students' interest in learning and understanding the OHS Act and Regulations and ensured that the students learned with understanding instead of just memorizing their work. Overall, evaluation of the games exercise proved to be very positive.

The success reported in this study is consistent with the literature on groupwork and highlights the need for such intervention or collaboration in the workplace post-graduation, as interpersonal skills, collaboration, intercultural communication and conflict resolution are actual skills required on the job. As Doel (2007, p. 5) said: the more we connect groupwork to everyday lives and work experiences, the more people will be able to bring in support of groups and groupwork. He adds that groupwork is not something mysterious, but is something that might be experienced when they participate in meetings, or indeed are thrown together with a number of strangers. Our global world requires graduates to interact and work with people from different cultures and nationalities, and (as demonstrated in this study *albeit* on a small scale) groupwork could well serve to promote communication and collaboration.

References

Accountancy SA. (2012) *Transformation: An Accountancy reality check*. [Accessed 30 August 2012 at http://www.accountancysa.org.za/resources/ShowItemArticle.asp?ArticleId=2487&Issue=1118]

Becker, C. and Glasscoff, M.A. (2005) Linking lessons and learning: A technique to improve student preparation and engagement with subject materials. *American Journal of Health Education*, 36, 1, 51-53

Bottino, R.M. and Ott, M. (2006) Mind games, reasoning skills, and the primary school curriculum. *Learning, Media and Technology*, 31, 4, 359-375 [Accessed 10 June 2011 at http://dx.doi.org/10.1080/17439880601022981]

Boud, D. (2007) Reframing assessment as if learning were important. in D. Boud and N. Falchikov (Eds.) *Reframing Assessment in Higher Education*. London: Routledge (pp.14-25)

Clapton, G. and Daly, M. (2007) Bridging the theory-practice gap: Student placement groups co-facilitated by lecturers and practice teachers. *Groupwork*, 17, 3, 60-75

Cohen, L., Manion, L. and Morrison, K. (2006) *A Guide to Teaching Practice*. London: Routledge Falmer

Davis, B., Sumara, D. and Luce-Kapler, R. (2000) *Engaging Minds: Learning and Teaching in a Complex World*. Mahwah, NJ: Lawrence Erlbaum Associates

De Freitas, S. and Griffiths, M. (2008) The convergence of gaming practices with other media forms: What potential for learning? A review of the literature. *Learning, Media and Technology Education*, 33, 1, 11-20. [Accessed 7 June 2011 at http://dx.doi.org.10.1080/17439880701868796]

Dempsey, J.V., Haynes, L.L., Lucassen, B.A. and Casey, M.S. (2002) Forty simple computer games and what they could mean to educators. *Simulation and Gaming*, 33, 2, 157-168

Doel, M. (2007) Editorial. *Groupwork*, 17, 3, 3-7

Dormann, C. and Biddle, R. (2006) Humour in game-based learning. *Learning, Media and Technology*, 31, 4, 411-424 [Accessed 6 June 2011 at http://dx.doi.org/10.1080/17439880601022023]

European Leisure Software Publishers Association. (2006) Unlimited learning: Computer and videogames in the learning landscape. London, ELSPA [Accessed 6 June 2011 at http://www.elspa.com/assets/files/u/unlimitedlearning_345.pdf]

Gee, J.P. (2003) *What Video Games have to Teach us about Learning and literacy*. New York: Palgrave Macmillan

Good, J. and Robertson, J. (2004) Computer games authored by children: A multi-perspective evaluation. in *Proceedings of the 2004 Conference on Interaction Design and Children: Building a Community* (pp.123-124) [Assessed 10 June 2011 at http://portal.acm.org/citation.cfm?id=1017852&dl=ACM&coll=portal]

Greer, L. (2001) Does changing the method of assessment of a module improve the performance of a student. *Assessment and Evaluation in Higher Education*, 26, 2, 127-138

Head, M. (2007) *Deep learning and 'topical issues' in teaching Administrative Law. Practice article*. [Accessed 10 June 2011 at http://www.austlii.edu.au/journals/LegEdRev/2007/9.html.]

Holmes, W. (2011) Using game-based learning to support struggling readers at home. *Learning, Media and Technology Education*, 36, 1, 5-19 [Accessed 7 June 2011 at http://dx.doi.org.10.1080/17439884.2010.531023]

Kafai, Y. (2006) Playing and making games for learning: Instructionist and constructionist perspectives for game studies. *Games and Culture*, 1, 36-40 [Accessed 10 June 2011 at http://gac.sagepub.com/cgi/content/abstract/1/1/36]

Kambouri, M., Thomas, S. and Harvey, M. (2006) Playing the literacy game: A case study in adult education. *Learning, Media and Technology Education*, 31, 4, 395-410 [Accessed 7 June 2011 at http://dx.doi.org.10.1080/17439880601022015]

Kane, L. (2004) Educators, learners and active learning methodologies. *International Journal of Lifelong Education*, 23, 3, 275-286

Killen, R. (1998) *Effective Teaching Strategies: Lessons from Research and Practice*, 2nd ed. Wentworth Falls, Australia: Social Science Press

Killen, R. (2000) *Outcome-based education: Principles and possibilities*. Unpublished manuscript, University of Newcastle, Faculty of Education [Accessed 10 March 2006 at http://www.schools.nt.edu.au/curricbr/cf/outcomefocus/killen_paper.pdf]

Killen, R. (2001) *Productive teaching and learning*. Paper delivered at The Eighth International Literacy and Education Research Network Conference on Learning, 4-8 July, Spetses, Greece

Lave, J. (1988) *Cognition in Practice: Mind, Mathematics and Culture in Everyday Life*. Cambridge: Cambridge University Press

Levy, D.P. and Merenstein, B. (2005) Working with stories: An active learning approach to theories of deviance. *Teaching Sociology*, 33, 1, 66-73

McFarlane, A., Sparrowhawk, A. and Heald, Y. (2002) *The Report on the*

Educational Use of Games. Cambridge: TEEM

Moll, L.C. (1993) Introduction. in L.C. Moll, (Ed.) *Vygotsky and Education. Instructional Implications and Applications of Sociohistorical Psychology*. Cambridge: Cambridge University Press (pp.1-30)

O'Sullivan, D.W. and Cooper, C.L. (2003) Evaluating active learning: A new initiative for a general chemistry curriculum. *Journal of College Science Teaching*, 37, 7, 448-452

Pahl, K. and Rosswell, J. (2005) *Literacy and Education: Understanding the new literacy studies in the classroom*. London: Paul Chapman Publishing

Rodriguez, M.C. (1984*) Current status of O.P.I. in Intensive Language Programs*. Paper presented at the Annual Meeting of the Southwest Conference on the Teaching of Foreign Languages, 1-3 March, Colorado Springs

Roth, W.M. (1994) Experimenting in a constructivist high school Physics laboratory. *Journal of Research in Science Teaching*, 31, 2, 197-223

Singh, P. (2010) Encouraging intercultural communication using an action research approach. *Systemic Practice and Action Research*, 23, 4, 341-352

Singh, P. (2007) Groupwork in multicultural classrooms: A South African case study. *Groupwork*, 17, 3, 43-59

Singh, P. (2004) *Towards improving equity in assessment for tertiary science students in South Africa: Incorporating an oral component*. Unpublished PhD thesis, University of KwaZulu-Natal, Durban, South Africa.

Sivan, A., Leung, R.B., Woon, C.W. and Kember, D. (2000) An implementation of active learning and its effect on the quality of student learning. *Innovations in Education and Training International*, 37, 4, 381-389

The Economist. (2010) *Colour me South African. Learning to live in a rainbow society*. [Accessed 30 August 2012 at http://www.economist.com/node/16248631]

The National Occupational Health and Safety Policy. *Revised version 3,* dated 23 July 2003 [Accessed 4 April 2011 at http://www.kznhealth.gov.za/acchealth/policy2.pdf]

Trochim, W.M.K. (2006) *Social research methods*. [Accessed 12 February 2011 at http://www.socialresearchmethods.net/kb]

Vygotsky, L.S. (1962) *Language and Thought*. Cambridge: MIT Press

Vygotsky, L.S. (1978) *Mind in Society*. London: Harvard University Press.

Vygotsky, L.S. (1981) The genesis of higher mental functions. in J. Wertsch, (Ed.) *The Concept of Activity in Soviet Psychology*. Armonk, NY: Sharpe (pp.144-188)

Williamson, B. (2007) Viewpoints: Teaching and learning with games? *Learning, Media and Technology*, 32, 1, 99-105. [Accessed 11 June 2011 at http://dx.doi.org/10.1080/17439880601414942]

Wright, J. and Forrest, G. (2007) A social semiotic analysis of knowledge construction and games centred approaches to teaching. *Physical Education and Sport Pedagogy*, 12, 3, 273-287

Young, J.R. and Upitis, R. (1999) The microworld of Phoenix quest: Social and cognitive considerations. *Education and Information Technologies*, 4, 4, 391-408