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Process Drama: Bridging the Arts and the Sciences

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ABSTRACT

Process drama involves participants using improvisation techniques in role-play to enact real-life scenarios. It focuses on the process rather than the final product and therefore allows students and teachers to simulate actual situations experientially and, in the process, develop problem-solving skills. It has been used as learning and teaching strategy in various disciplines in the arts and the sciences. Students enjoy situated learning through contextualisation of concepts within their fields, acting out scenes that deal with issues pertaining to their fields of study. Process drama is, in essence, learning by doing while at the same time creating a real-life environment in the classroom that makes the educational process organic. It is a useful tool with which to help develop the social interactional skills of people of the sciences.

Keywords: Process drama, role-play, situated learning, sciences, social interaction

INTRODUCTION

Having been an English-language instructor most of my working career, I approach this technology-based discussion with a sense of challenge. As a product of English literature and Applied Linguistics education, and as a practitioner of English-language teaching, my knowledge of engineering, medicine and most other science-related fields is, at the most, extremely limited. However, my experiences with drama-based language teaching, and the observations I have made and feed-back I have received provide me with the scope to look at possible ways process drama, and in particular, role-play (adopting the persona of someone else and acting out a scene), can be applied to the sciences. This paper looks at the application of such arts-based experiential strategies aimed at developing the oral-interaction skills of students of science, technology, engineering, medicine, and so on. Process drama has been getting increased attention

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over the past few years as a pedagogical tool that gives students somewhat-free rein to create drama worlds in which issues relevant to them are tackled (Kao & O'Neill, 1998; Liu, 2002; Stinson & Freebody, 2006; Stinson, 2008). Graduates and undergraduates of disciplines associated with science and technology are quite often stereotyped as generally not part of the mainstream of society in terms of their social and psychological outlooks on life (Butler, 1989; Chan & Fishbein, 2009; Eugster, 2011; Seat & Lord, 1999; Solomon, 1996). They appear to show limited interest in social matters because of their apparent focus on issues pertaining to their academic/ professional pursuits or expertise. Role-play can contribute towards developing their interactional and interviewing skills and can provide an impetus for them to participate more actively in events outside study or work (Andersson & Andersson, 2010; Jackson, 2003; Nestel & Tierney, 2007; Pearce, 2001; Prince, 2006; Seat & Lord, 1999; Sturges, Maurer & Cole, 2009).

IMAGE PROBLEMS

Fairly or unfairly, scientists and engineers have, generally speaking, sometimes been portrayed as being less proactive than those who have had training in the humanities. More than half-a-century ago, it was observed that "science attracts men whose temperament is grave, awkward and absorbed" (Bronowski, 1956, p. 76). According to Solomon (1996), engineers generally lack "... strong interpersonal skills needed to forge consensus in a large organization and to deal effectively with customers and vendors" (p. 7). He also mentions the fact that many engineers, in addition to having difficulty with cultural nuances in a broad sense, have problems in the area of verbal and writing skills, basically because their exposure to the humanities is restricted. Bronowski (1956) suggests that scientists' interest in the arts is rather peripheral, a reality that appears to be still in evidence today. For example, Eugster (2011) states that scientists are still being portrayed in the movies as loners with unorthodox habits who find integrating into society comfortably a difficult proposition. In fact, they have even been referred to as living in silos "...often disengaged and disinterested in challenges that are not completely within their field..." (Chan & Fishbein, 2009, p. 6). Butler (1989) describes science students as being somewhat dissociated from the real world, while Seat and Lord (1999) refer to the field-independent quality of students of Science, Math, Engineering, and technology which makes them effective in analysing and structuring but poor in interpersonal relationships. They further state that members of the technical world lack performance skills such as "… communication abilities, interpersonal interaction, conflict mediation, team-performance, understanding of technical culture, and sensitivity towards diverse populations" (p. 384).

It is not unusual for an engineer to be portrayed in cartoons as "a nerdy-looking character, with thick glasses, short hair,

several pens and pencils in his shirt pocket, perhaps in a plastic pocket protector, wearing clothes that are never quite up to fashion" (Braham, 1992, as cited in Beder, 1999, p. 13). Such an uninspiring image can result in research funds not being readily made available, children being dissuaded from looking at science as an attractive career, and the general public knowing little or nothing about them (Eugster, 2011). Similarly, the gender-stereotyping of engineers as being male can lead to female students not being attracted to engineering studies, particularly if there is little space in an engineer's life for marriage or a family (Steinke *et al*., 2008). There also appears to be a lack of interest in the fields of science-related education among non-whites in western societies because scientists are traditionally depicted as white. Howes and Cruz (2009) provide samples of their students' written responses which indicate their awareness of the marginalised status of non-whites and women in the field of science. According to Steinke *et al*. (2007), it is necessary to change the image of science and scientists in order to "...encourage traditionally nonparticipants (e.g., women, people of colour) to consider careers in science and engineering" (p. 56). Such a change can be initiated through integrating process drama into curricula.

PROCESS DRAMA

Process drama is a creative, presentation-based learning and teaching strategy involving a number of activities, role-play being one of them. For it to work effectively, all those participating in it should have knowledge of, and experiences with, the subject matter, in order to add veracity to their role-play (Stinson & Freebody, 2006). It basically refers to what occurs during the *process* of role-play. The eventual fate of the *product* (the scene which is being enacted) is not a cause for concern as it is "…an ephemeral and unrepeatable event" (Stinson, 2005). In other words, the focus is on what goes on during a process drama activity and not on an eventual staging of the item before an audience. The content is more important than the production (Weltsek-Medina, 2008). To put it differently, the performing is more relevant than the performance, regardless of whether the role-players are arts or science students. Butler (1989) refers to role-play for science students as being less about voice-quality and costumes and more about exchanging opinions and expressing attitudes, a central consideration when applying process-drama methodology.

Situated learning, in which activities take place within authentic environments and learning occurs in context, is an important facet of this technique. It works on the premise that knowledge can be attained through simulating an environment that reflects what goes on in actual situations. So, for example, engineering undergraduates could be trained to handle relevant situations like discussing a building project or solving structural problems through situational role-play. Similarly, medical students could role-play doctor-patient interviews. Unlike a playwright-written piece of work, where

the motives, actions and oral output of the players, and the outcomes of the play, are predetermined, a process drama evolves and unfolds as organically and as fluidly as the role-players want it to. Role-playing is an integral part of process drama but, unlike normal role-playing activities in which each participant takes on a role and sticks to it right up to the culmination of an enactment, process drama allows some of the players to take on two or more roles, if necessary. A performance can also be stopped mid-way for a performer to step out of his or her role to make a comment or seek clarification. The instructor/professor, for example, might realise that the drama is getting out of control or is straying from its objectives and therefore wish to suspend it momentarily to set things right again.

A careful pre-planning is necessary, but once it begins, it develops in a natural, wholesome fashion, going where the hearts and minds of the players take it interactively. It should not be hindered by a script written by someone with an individualistic, personal vision. Its most laudable characteristic is that it takes the focus away from the instructor and puts it on the students, making it an ideal learner-centred pedagogical tool. There is evidence to show that by creating a student-centred atmosphere that resembles the world outside the classroom rather than one involving teacher-centred lessons, oral output increases (Kagan, 1995; Long & Porter, 1985). It is by speaking that we impart knowledge, make our thoughts and feelings known, and convey our values and attitudes to those with whom we interact, receiving the same in return. The benefit of this to technologists who are less inclined to participate in extended oral-interaction is obvious.

A process drama works effectively, as Liu (2002) points out, with the following: Firstly, there should be context, i.e. a theme or a topic. This is important because "… learning takes place most effectively when it is contextualised" (Simpson & Heap, 2002, p. 47). Next, a pre-text has to be established. This is the starting point or stimulus which activates the performance. Following that, the roles for the students and teacher are finalised and there is a short preparation period. Once the role-playing commences, the tension, which is initially created through the context and pre-text, starts to build. Tension here refers to the excitement and involvement of the participants due to the inter-play between what they know and what they do not know, and what they anticipate and what eventually transpires. During the performance, there should be oral output and physical involvement. Finally, at the end of the performance, the instructor should generate a reflective discussion on what happened, what worked, what did not work. Such reflection benefits both the students and their instructor/professor, the former learning about themselves, their peers and the learning process, and the latter getting insights into how effective his or her teaching style is and what changes need to be made (Liu, 2002).

APPLYING PROCESS DRAMA

In one of my ESL (English as a Second Language) classes in March, 2011, I conducted a process drama with 15 students from various disciplines (Law, Business, Humanities, and Information Technology). These non-English-speaking-background students were from Malaysia, China, Japan, Kuwait, Pakistan, and Taiwan. The scenario (or context) involved building a highway to connect the Central Business District of a city to a small township. The stimulus (or pre-text) stipulated that the highway would expand the township and create a satellite city over time and, in order to do that, parts of a forest-reserve and farms that lay between the city and the town would have to be removed. The students were divided into groups of three, with each group role-playing separate identities, i.e. civil engineers, farmers, greenies, business-people, and politicians. I took on the role of Mayor, thereby aligning myself with the politicians. After about 30 minutes of preparation time, during which each group worked out a strategy to either support or reject the scheme, we enacted a scene whereby everyone sat around a table in the Mayor's office and put forward their arguments. Initially, there was turn-taking, i.e. each group submitted their views, after which there was a general brain-storming. It was interesting to note that most of the students stayed in role throughout. There was a temporary suspension of who they were in real life as they entered the world of their imagined characters and participated actively. The engineers stated their case in a technical, analytical fashion, the greenies fought passionately for conservation, the business group pointed out the financial advantages, the farmers sought compensation and suitable relocation, and we politicians … well, we played politics! I made sure that, in the midst of their on-going interaction, the role-playing kept expanding and unfolding layer by layer. The dramatic tension accumulated as each party sought to have its views accepted, with relevant subject-specific vocabulary, oral comments and body language being employed to establish control. Once this was completed, the class and I had a post-activity reflective discussion on what had transpired.

While this exercise was mainly to create a non-bookish, anxiety-free environment for English-language learners, with a real-world feel which would encourage the students to speak in English, similar role-play activities for engineering students could be conducted based on technical and industry-specific details. With a few adaptations, a scenario devised by Baiges (2010) for the Online Ethics Centre, which is maintained by the National Academy of Engineering in the USA, is a good example to work with. We could start with a context like "The effects of disposable ink cartridges". A pre-text could then be established, as follows: "A company which manufactures disposable cartridges has decided to convert to the production of non-disposable cartridges because it has been facing stiff competition from other companies manufacturing the disposable variety. Besides financial considerations, such a move will also be environmentally-

friendly. However, it will mean downsizing or closing down the manufacturing plant, resulting in a heavy loss of jobs." Students and the instructor/professor could take on roles like company bosses, engineers, environmentalists, union representatives, members of ethics organizations, and so on. After a given period of preparation in groups, the enactment can proceed with, perhaps, one of the students (or the instructor/professor, because role-changing is common in process drama) playing the role of a TV news-reader who gives a summary of events, or a TV personality who interviews relevant people. The process drama can then unfold in an organic, unscripted fashion with everyone participating in "…a collaborative meaning-making process through the medium of role … to solve problems and to employ higher-order thinking processes" (Stinson, 2005). It will give participants the opportunity to view the scenario from various angles and consider the opinions of others, thus giving the activity an all-encompassing characteristic that a normal lecture may not have. Rather than a situation where knowledge is conveyed by the professor in a uni-directional fashion, the process becomes more student-centred. There is greater participation by the students and learning becomes more purposeful, rewarding and satisfying.

PROCESS DRAMA IN THE SCIENCE ARENA

This humanistic-based form of educational play-acting has been channelled into the sciences for many years (Loui, 2008; Nestel & Tierney, 2007) to prepare students for working life. Howes and Cruz (2009) mention how trainee Science teachers in the United States get deeper perspectives about science and scientists from role play. Jackson (2003) sees role play in education as serving a number of purposes, among which are helping students learn about science through 'authentic' experiences, enhancing their communicative skills in the process of applying what has been learned, providing them opportunities to learn about themselves and others, keeping them interested in their studies or generating such interest where it's lacking, giving them the motivation to come up with their own ideas and concepts, and giving them the confidence to express their feelings in a safe environment of shared experiences. He also mentions problem-solving, teamwork, time-management, and accountability as factors associated with role-play. Prince (2006) mentions the value of role-play to young engineering students of non-western backgrounds at York University, Toronto, Canada. The role-playing dealt with cultural and ethical values, which were alien to western society and which had the potential to create conflict. It culminated in student-written scripts, which reflected a heightened awareness on their part of the need for professional integration. This is akin to the social function of process drama which helps prepare students for the real world that exists outside the walls of educational institutions (Liu, 2002).

Pearce (2001) contends that students of technology generally do not concern themselves with the social implications

of the development of technology. He found that role play helped raise such students' awareness of this shortcoming of theirs through an exercise for power engineering students, involving a make-believe steamboat explosion. Role-play can also assist students who are having problems with demanding courses. For example, Sturges *et al*. (2009) noted that undergraduate Science students who found Physiology a difficult subject were able to relate better to that field of study through role play. They performed better on the post-test, became more involved in class, and found role play satisfying and enjoyable. However, getting students of Technology or Engineering to participate readily in role play is not always an easy task, perhaps because it is 'unscientific' and unfamiliar. Seat and Lord (1999) state that such students not only feel uncomfortable about participating in make-believe scenarios without relevant training but also tend not to want to indulge in extensive dialogue. According to them "…technical people in academia and industry resist learning performance skills" (p. 388). To tackle this situation, Seat and Lord devised 6 modules which incorporated coaching (to suit the cognitive styles of field-independent learners) and interpersonal communication (role-play). Doubtless, such a project needs time for it to be successfully implemented. It cannot be conducted at one sitting, but process drama can. Once engineering students get the sort of exposure and training that Seat and Lord mention, there is the possibility that they will be able to handle process drama with greater comfort.

One key element in process drama is taking on the persona of others, to get a feel of their thoughts and sentiments. Thus, medical students could play roles of doctors and patients interchangeably. By role-playing doctors, they may be able to experience situations like advising patients, handling tough questions, treating the sick and injured, and addressing moral and ethical values associated with the profession. In the role of patients, they may be better able to understand the extent to which medical help can benefit them, and also the limits and constraints a doctor faces. It could make internalising the Hippocratic Oath more meaningful to aspiring doctors. In a 2003 study involving 284 first-year medical students at Imperial College in London, 77.8% of them reported that role plays had benefited them in relation to patient-centred medical interviewing skills (Nestel & Tierney, 2007). Meanwhile, third-year undergraduate medical students in Germany exhibited improved physician-patient interaction as a result of participating in specially-designed role-play incorporating medical procedure (Nikendei *et al*., 2007).

Stinson (2008) explains that process drama works on the premise that students and their teacher "...work within designated roles to solve problems and investigate issues highlighting the complexity of the human condition in a particular context" (p. 9). An example of how role-play can give participants insights into the complex nature of human psychology can be seen in a journal entry of a student participating in a 2-week-long role-play activity (Loui, 2008). The activity, which dealt with the

impact of new technologies on society, sought to increase the students' awareness of differing perspectives among people. The student wrote:

> *I realize that often times I take what people tell me at face value. I do not really think about what that [they] did not tell me, which, I have learned can often times say more than what someone tells you. The role-play taught me to think about what people hide about themselves (p. 9).*

The statement above encourages one to believe that drama allows students to use their socially-oriented analysing skills in ways not dissimilar to those of their impersonally-oriented, scientific ones. Indeed, it has been postulated that there are certain points of convergence between the arts and the sciences (Bronowski, 1956; Ødegaard, 2002), particularly in relation to discovery and creativity. Using the poem and the theorem as examples of the arts and the sciences respectively, Bronowski (1956) declares that there is "unity in variety" (p. 32). Didier (2000) makes reference to exhortations in France in the late nineteenth century by the Catholic Church that engineering schools should include elements of the humanities in their curricula, in order to create engineers who were accountable to society. She mentions that in 1995, the French engineering authority (Engineering Title Committee) responsible for accrediting engineering institutions directed such institutions to include elements of communication and ethics in their curricula. It has been argued that "...engineering students are more interested in solving problems ... than in understanding what happens and why" (Didier, 2000, p. 329); nurturing ethical values, through role play for example, could be the humanities' contribution to their education.

While the impact of drama in the world of science-related education is quite well documented, there is evidence that science can return the favour and give role-playing a new dimension. One example is the application of technology to transform process drama from its physical-world mode to a virtual-world mode, through which training can be provided in a number of areas like patient-doctor communication, negotiation, conducting meetings, culture, and foreign languages (Seif Al-Nasr, 2008).

CONCLUSION

A change in the attitudes of those with technological background is vital if they are to entrench themselves successfully as productive and dynamic members of society. Chan and Fishbein (2009), in discussing the plight of engineers in Canada, state that they have to have effective communicative skills vis-a-vis different languages and cultures if they are to succeed as global engineers. They need to know about social issues that impact on speakers of other languages or practitioners of a variety of cultures. What better way than to implement process drama as a way of helping them become

more sensitive to cultural differences? If they are to become more than just "technical skill-applying automata" (Chan & Fishbein, 2009, p. 5), they need to engage more effectively with the world outside their fields of expertise, acquiring competent communicative abilities and also skills in the area of group-dynamics. The Canadian Engineering Accreditation Board underlined the relevance of these attributes by decreeing, in 2008, that, among other qualities, engineering graduates needed to work as part of a team, have communication skills, understand the impact of engineering on the world, and pay heed to ethics and equity (Chan & Fishbein, 2009). Through role-play and process drama, it is possible to incorporate elements of play-acting into traditional engineering courses. For example, students could enact scenarios based on the characteristics of successful global engineers, or on situations faced by modern-day engineers as they step out into the world beyond their technical boundaries. Andersson and Andersson (2010) suggest that Engineering students can develop their personal and interpersonal skills while learning about professionalism in Engineering through role play involving themselves and professional engineers in an authentic industrial environment. Such a framework reflects the ideals associated with process drama, i.e. the 'expert' figure (instructor, teacher, professor) works with the students in role-play simulations combining the real and the imagined, negotiating and renegotiating views and thought-processes as they unfold while validating or restructuring personal values and assumptions. There is no specially-selected or written script and no audience, other than the participants themselves. Process drama can be described as being less than theatre (in the sense that the lead-up time places less importance on formal, sophisticated production plans and rehearsals) and more than on-the-spot improvisation (in the sense that participants have time, albeit limited, to work out the rules of engagement). There is an element of immediacy in process drama that challenges participants to think on their feet, as they deal with familiar or semi-familiar issues in role-play mode. Learning becomes meaningful, participants start opening up to others because they have to communicate their ideas, values and attitudes, and their motivation in relation to the subject-matter increases (Liu, 2002). Engineers, scientists, doctors and technologists who are tuned in to the world outside their areas of expertise could be the beneficiaries of this humanistic input.

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