

- Simpson, Kate (2004), 'Doing Development': The Gap Year, Volunteer-Tourists and a Popular Practice of Development', *Journal of International Development*, 16 (5), 681-92.
- Simpson, Kate (2005), 'Broad Horizons? Geographies and Pedagogies of the Gap Year', University of Newcastle, Australia.
- Sin, Harg Luh (2009), 'Volunteer Tourism: 'Involve Me and I Will Learn?''', *Annals of Tourism Research*, 36 (3), 480-501.
- Sinclair, Cameron and Stohr, Kate (eds.) (2006), *Design Like You Give a Damn: Architectural Responses to Humanitarian Crises* (London: Thames & Hudson).
- Smith, Jeremy, Brown, Lizzie, Blackhall, Lachlan, Loden, Dan, and O'Shea, Julian (2010), 'New Partnerships Linking Universities and NGO's on Education for Development Engineering: Case Study from Engineers Without Borders Australia', Joint International IGIP-SEFI Annual Conference (Trnava, Slovakia).
- Soderman, Nadia and Snead, Susan L. (2008), 'Opening the Gap: The Motivation of Gap Year Travellers to Volunteer in Latin America', in Kevin D. Lyons and Stephen Wearing (eds.), *Journeys of Discovery in Volunteer Tourism: International Case Study Perspectives* (Cambridge: CABI), 118-30.
- Sotomayor, Mario L. and Benavente, Rosario C. (2009), 'Towards an Integration of Formal and Informal Curricula in Engineering Schools', *Proceedings of the Research in Engineering Education Symposium 2009* (Palm Cove, Qld).
- Sutton, Pollyanna (2008), 'Architects Without Frontiers', *The Age*, Melbourne, 13.02.2008. 12.
- Tsing, Anna L. (2003), 'Agrarian Allegory and Global Futures', in Anna L. Tsing and P. Greenough (eds.), *Nature in the Global South: Environmental Projects in South and Southeast Asia* (London: Duke University Press), 124-70.
- Wearing, Stephen (2001), *Volunteer Tourism: Experiences That Make a Difference* (New York: CABI).
- Wearing, Stephen (2004), 'Examining Best Practice in Volunteer Tourism', in Robert A. Stebbins and Margaret Graham (eds.), *Volunteering as Leisure/Leisure as Volunteering: An International Assessment* (Wallingford: CABI).

The Impact of an In-service Professional Development Course on Writing Teacher Attitudes and Pedagogy

Yin Ling Cheung, English Language and Literature Academic Group, National Institute of Education, Nanyang Technological University, Singapore

Abstract

In education, it is commonly believed that the quality of teachers' learning experiences directly affects the quality of their students' learning experiences. Specifically, teachers' continuing learning may bring about positive effects on student learning. For the past ten years or so, research has emphasized the effects of professional development courses on teachers in hard science disciplines. Little attention has been paid to study the influences of those courses on teachers in the 'soft' sciences, such as English language, especially in the area of teaching of writing. Against this background, I undertook a study to investigate how an in-service professional development course influences the teaching attitudes of writing teachers who enrolled on the course and their teaching practice. I argue that the professional development course empowered the teachers with skills useful for the teaching of writing. I also argue that the course positively changed the attitudes of the teachers towards their practice in the teaching of writing. It is suggested that teachers need to engage in continuing professional development to improve the quality of their teaching.

Keywords: professional development; writing teachers

Introduction

Over the last decade, the fields of teaching and teacher development have seen a number of studies about the impact of professional development courses on teaching and student learning (Buczynski & Hansen, 2010; Loucks-Horsley *et al.*, 1998; McDermott & DeWater, 2000; Stein *et al.*, 1999). A number of studies demonstrate that professional development courses enhance teachers' content knowledge and strengthen their pedagogical skills (Radford, 1998; Supovitz *et al.*, 2000). Another set of studies has identified that these courses boost teachers' confidence in teaching their subject matters and foster a positive attitude towards teaching and student learning (Stein *et al.*, 1999). Much research has focused on the professional development of teachers in hard science disciplines in the United States and Britain. Little research has been conducted to investigate the influences of professional development courses on teachers in the 'soft' sciences such as English language writing. In Singapore, teacher education has limited coverage on the teaching of writing. To address the teaching of writing to secondary school students, the Bachelor of Arts (English Language) undergraduate programme in a university in Singapore offers a compulsory course in Year 4, and two electives in Year 2 and Year 4. These courses mostly impart theoretical knowledge to the student teachers, rather than offer skills that are of immediate practical use in the teaching of writing. Against this shortage of practical courses for

writing teachers in Singapore, I undertook a study to investigate how a professional development course influences the teaching attitudes of writing teachers and their teaching practice.

The study took place during a four-week professional development course offered by a university in Singapore. The participants, who were practicing teachers of English, were required to complete twelve hours of coursework consisting of four workshops, each of which involved three hours of classroom learning. The data of the study were gathered from these four workshops that I delivered in 2010. The workshops covered topics such as strategies used by successful student writers in composing effective expository texts; classroom activities for explicit teaching of expository writing; and ways to help students develop coherence in writing. To assess the participants' understanding of the concepts and skills learned in this course, I required the participants to submit a portfolio of work towards the end of the fourth workshop. The portfolio comprised teachers' reflections on the workshops and four lesson plans in teaching expository and argumentative writing incorporating the insights and strategies they had learned from the workshops. At the end of the four-week professional development course, depending on their performance, the participants were given a grade of pass or fail on their course certificate.

I addressed the following questions in my study:

- (1) In what ways did the professional development course impact teachers in terms of their pedagogical practice?
- (2) In what ways did the professional development course influence the attitudes of the teachers in the teaching of writing?
- (3) What factors promoted and hindered the teachers' pursuit of professional development?

The study adopted a survey approach involving 28 participants from the aforementioned in-service course. They all gave me consent to use their data for research purposes. Since it was difficult getting busy in-service teachers to take part in face-to-face or email interviews, I asked the teachers to complete the surveys during the workshops. These writing teachers all worked with students from neighbourhood schools. I felt that they would provide interesting data about the professional perceptions and development of front-line writing teachers.

I adopted the following steps in my research to increase the validity of the findings. Firstly, I avoided leading questions in my survey and used questions that were open-ended and gave the teachers freedom in stating

their own opinions. Secondly, I did member checking by sending the survey results to the participants so that they could review and check my interpretations of their responses for accuracy.

Data for the study were collected through pre- and post-course surveys (see Appendices A and B) with the 28 in-service teachers, triangulated with data from the teachers' end-of-the-course portfolios as well as their course evaluations of me as their instructor, which the participants completed on the last day of the workshop. Each survey took about fifteen minutes to complete in class. Data from the end-of-the-course portfolios and course evaluations on the instructor corroborated the findings from the surveys, which shed light on the teachers' opinions on their own professional development.

The survey data were processed by a research assistant with a bachelor's and master's degree in electronic engineering from a major university in Hong Kong. First, the research assistant recorded all the survey responses onto an Excel spreadsheet. Then, she imported the Excel file into NVivo 9, which helped identify the frequencies and emerging common patterns of responses that answered the research questions. From the student teachers' end-of-the-course portfolios and their course evaluations of the instructor, data relevant to the teachers' learning and professional development were sorted out to triangulate with the survey data.

The 28 participants in the study were local secondary school teachers, who taught Secondary 1 to 5 English subjects. 52% of the teachers used Mandarin as their native language, 28% used Malay, and 20% used Hindi. English is the official language in Singapore, the country where the study was conducted. The teachers were all educated locally with a teacher training qualification. The teaching experience of the participant teachers ranged from one to five years. They all taught in neighborhood schools. 64% of them taught in schools where the students were weak in the English language and many had difficulties producing coherent pieces of writing. 20% taught in schools where most of the students were relatively strong in the English language. The rest taught in schools where the students had mixed abilities in the English language. An important part of the writing experience of the teachers was job related, including the writing of teaching materials such as sample recounts, sample narrative essays, sample play scripts, and assignment worksheets for their students. Other types of writing that the teachers engaged in concerned lesson plans, report cards, testimonials, professional emails, and commentaries on their students' writing. Apart from job-related writing, some

of the teachers wrote for pleasure, including personal blogs and letters to friends and family. The majority of the teachers (82%) considered themselves average writers although they were engaged in daily writing activities. When asked how they would evaluate their own instructional practices in the classroom, none of them provided a positive rating. They described their pedagogy in words such as 'inadequate', 'not very convincing', 'average', 'fairly average', 'having definite room for improvement', 'so-so', 'having no structure', and 'needing to be equipped with a variety of instructional methods and strategies'. In the pre-course survey of the study, the teachers mentioned that they were not completely confident in their teaching. This could be attributed to the fact that they did not receive formal training in the teaching of writing. They learned to teach writing on the job, frequently through informal means such as imitating and emulating their previous secondary school teachers or senior colleagues, reading guidebooks in the market or published by the Ministry of Education, taking part in sharing sessions in their schools, and borrowing strategies from online resources.

In-service teachers' motivation for attending the professional development workshops

I start by explaining why the teachers enrolled in the professional development workshops. The information I present is based on the pre-course surveys unless otherwise stated.

- A first reason that explained the teachers' decision to take part in the professional development workshops was the inadequate training they felt that they had received in teaching writing to secondary school students. One teacher said: 'I lack the skills and knowledge to teach good writing.' Another teacher felt that she was not confident in her teaching because of the 'insufficient amount of training I have had'. A teacher added: 'I need to be equipped with more strategies to teach writing.' Without sufficient training in how to teach writing, the teachers might have been frustrated by the lack of effective teaching techniques they could use in the classroom.
- Second, as Tan (2008:95) identifies, many academically weak students who take subjects of a technical nature 'may have little or no genuine interest in their studies'. Many students of the participant teachers were not motivated in classes on writing compositions, and the teachers hoped to better motivate their students through what they would learn in the workshops. One teacher added: 'Sometimes students are not interested in writing and just want to get to the end of it. They do not pay

attention to the development of their ideas. It is difficult to sustain their interest.'

- A third reason that drove the teachers to attend the professional development workshops was the need to help their students develop content knowledge in writing. The following was a typical response mentioned by many of the teachers: 'Students find it difficult to start their essays. They do not have enough/adequate knowledge on subject to write.' Research by Tan (2008:94) has shown that many students do not read in their spare time and they do not consider reading a pleasurable pastime. Their knowledge on current affairs and current issues can be quite limited by their lack of sufficient reading activities. In the end-of-course portfolio, one teacher said: 'Students do not have enough points in their essays because they are not well read or they cannot apply the knowledge they learned from other subjects to facilitate their composition writing.'

Through attending the professional development workshops, participant teachers hoped to improve teaching techniques they could use in the classroom and motivate their students through what they learned in the workshops. They also wished that the professional development workshops could help students develop knowledge in writing. In the next section, the impact of professional development workshops on improving teachers' pedagogical skills will be summarized and discussed.

Impact of professional development workshops on improving teachers' pedagogical skills

The post-course survey data show that the teachers' efforts in attending the workshops helped equip them with a range of useful skills in teaching expository writing. The pedagogical skills that the teachers learned were summarized in the following. In the summary, all the teachers' responses were quoted verbatim without the corrections of grammatical errors. Quotations taken from the participants' end-of-course portfolios are marked with 'P' and those taken from the course evaluations are marked with 'E'. Those taken from the post-course survey are marked with 'S'.

1. Adopting various resources for teaching of writing

As Tan (2008) identifies, many teachers do not have adequate instructional resources to draw on for their teaching, as most materials in commercial markets do not cater to the interests and needs of students who are weak in the English language. From the teachers' end-of-the-workshop portfolios, in the lesson plans they created, they incorporated the resources gathered from the professional development workshops to design their writing lessons. Some of the resources included news

videos, newspaper articles, YouTube videos, model essays, and debate. They felt that if the resources were used appropriately, their students would be able to learn content information from the sources:

I have learned to access more websites and resources for news articles and current affairs in order to give students background knowledge of the task / topics. (P)

I learned to select essays that are very rich with data and key arguments to widen students' knowledge and awareness of the subject matter. (P)

Using various pedagogical resources could help break the monotony of a writing classroom. Teachers felt that learning would be enjoyable and stimulating to students who were engaged in group activities such as debates and the jigsaw:

I am more confident of delivering a lesson on expository writing through the use of debates. Students will be actively engaged in group activities. (P)

The jigsaw activity would raise the motivational level of students regarding expository writing as it is fun and engaging. The activity would serve as a good confidence booster. It is an extremely effective way of garnering the interest of students and tapping on their competitive spirit. (P)

The participants in this study learned to follow the recommendation by Dörnyei (2001), who suggests that teacher educators should make learning more enjoyable and stimulating by incorporating various class activities to increase student involvement and their motivation to learn. Teachers should give their students opportunities to share, negotiate ideas with their peers, and reach a consensus of meanings about certain topics (Lemke, 1990).

2. Introducing strategies that were used by good student writers

In the professional development workshops, many teachers commented on the usefulness of reading good and authentic student writing on expository genres. An essential aspect of the professional development workshops was to expose the teachers to different models of writing. Once the teachers have internalized the features of good student writing, the knowledge can be transferred to their students, which will produce a positive impact on the student learning (Porter *et al.*, 2003).

We were taught how the good students wrote their thesis statement, topic sentences and supporting

sentences. In addition we learned how they use cohesive devices and connectors to link ideas in the text. (S)

In the workshop, I learned the explanation on topic statements, supporting statements, concluding statements and transition words. I think that if I made this very clear to my students, their argumentative essays will be much improved. This will especially benefit the weaker students. (P)

3. Teaching students how to develop coherence in writing

In the pre-course survey, many teachers were concerned about their students' difficulty in writing coherently. Teachers felt that it was important to learn how to teach coherence in writing. Based on what they had learned, they could convince the students that coherence is a 'concrete concept that can be described and learned in a classroom' (Lee, 2002:37).

This workshop taught us about coherence. We now better understand the features of coherence writing. The coherence checklist is a very good way to ensure that the students write a good expository writing. (P) The strategies about teaching coherence were really very good. Understanding the macro structure makes things so much easier for the students. (S)

I am now able to highlight to my students the importance of setting paragraph level goals and coherence to expository writing. (S)

Impact of professional development workshops on teachers' attitudes towards writing practice

The post-course survey data throw light on the impact of the professional development course on the teachers' attitudes in the teaching of writing. The data consistently suggest that the teachers' learning experience in the workshops was positive. Contrary to prior studies that reveal the failure of teacher development courses (Garet *et al.*, 2001 in the United States; Meiers & Ingvarson 2005 in Australia), this study represents an example of success in that, through the professional development workshops, the teachers have enhanced their knowledge and pedagogical skills that they can apply in their classrooms.

As evidence for the success of the workshop, several teachers said that they got a better idea of how to approach the teaching of writing than before:

- I didn't really know how to go about teaching writing before but now I do.
- I didn't know how to teach writing before. But now, after the workshops, I become more aware of good

writing and it made me think of the philosophy behind good writing.

- Before the workshops, I was not sure how to teach. After the workshops, I got some teaching ideas.

In the pre-course surveys, several teachers demonstrated a narrow interpretation of the teaching of writing. Their responses to the post-course surveys indicated that the workshops did broaden their horizons of understanding of writing and writing pedagogy. These responses from the post-course survey were summarized as follows:

- Often we look at coherence at the paragraph level. However, after these workshops, we look at coherence from a broader perspective.
- Before the workshops, my 'goal' was for students to answer the question with appropriate points. After the workshops, there is more to learn about teaching expository writing that I should be aware and take note of.
- In the past, I thought that writing was just coming up with what to write. Now, there's actually a structured development that students can learn systematically.

Before the workshops, when asked how they would describe their perception of the teaching of writing before they attended the workshops, a common response was 'difficult'. In contrast, towards the end of the final workshop, they had changed their perception to 'easier' and they believed that they had become ready to 'use different strategies to teach writing'. From the course evaluations of the instructor, one participant commented: 'The workshops make teachers confident in teaching students how to do well in expository writing.' The findings suggest that positive experience in teacher professional development may 'hold the promise of transforming teaching and learning for both teachers and students' (Lieberman & Miller, 2008:106).

Aside from expanding their pedagogical strategies, two teachers said they had changed their attitudes in teaching, compared with before they took the workshops. They said that after the workshops, they enjoyed teaching writing more since they had discovered new and engaging ways to teach writing in their classrooms. In the post-course surveys, when asked to give new pedagogical tools in teaching expository writing, a number of the participants said 'YouTube videos for learning content knowledge', 'internet sources', 'debates be embedded in a lesson on exposition', and 'fun and engaging group work activity like re-ordering jumbled sentences in logical order'. One participant commented in the course evaluations: 'The materials are very relevant and will be useful to us. The

workshops have addressed key areas that teachers have problems with.'

These above comments suggest that the professional development workshops did bring about a positive change among in-service teachers in terms of their perceptions of and attitudes to teaching writing. It should be noted, however, that in the actual classrooms, teachers sometimes may be unable to incorporate the skills they have learned from similar professional development workshops. Indeed, transformation of teaching can be a complicated issue involving how the teachers' beliefs and pedagogy interact with school culture and its structure (Avalos, 2011; Opfer *et al.*, 2011).

Facilitating factors and the importance of continuing professional development

The success of the professional development workshops in fostering teachers' learning can be attributed to two reasons. First, teachers took the initiative to attend all the four workshops and complete a portfolio despite their heavy teaching and administrative workload in schools. As Sandholtz (2002) points out, very often, teachers may not be motivated to take part in professional development activities due to their packed schedules and full loads of school responsibilities. The participants in the study were highly motivated learners who seemed to believe that the workshops would be a meaningful and rewarding experience not only to them, but also indirectly to their students. All teachers in the post-course survey expressed that they would apply the knowledge they had learned from the workshops to their actual teaching.

Second, school principals' support for professional development by giving the time off for the teachers to attend the workshops as well as financial support from the Ministry of Education, facilitated the teachers' participation immensely. Without the time off, the teachers would have found it impossible to squeeze the workshops into their busy schedules despite the workshops' clear benefits for their professional development. Without financial subsidies such as waivers of course fees, many of the teachers would have found it burdensome to afford the course fees which were still significant although they were charged at cost.

With strong support by their schools and the Ministry of Education for attending the workshops in this study, it is hoped that the busy secondary school teachers will sustain their passion for life-long learning. In the words of James *et al.* (2007:63), getting 'continuous and progressive professional development' is believed to be beneficial to teachers. Teachers can engage students as lifelong learners only if teachers themselves are engaged

in lifelong learning (Armour & Makopoulou, 2012). Without teachers' continuing professional development, it may be difficult for teachers to improve the quality of their teaching, which may eventually affect the whole-school improvement.

The work reported in this paper was a modest-scale study conducted in the context of one professional development course. Although it is difficult to estimate the extent to which the present findings can be generalized to larger populations, the insights from this study have enabled us to understand better how professional development workshops may expand the pedagogical skills of teachers and make a positive impact on their attitudes towards the teaching of writing. Teachers in general need to engage in continuing professional development in order to improve the quality of their teaching. Principals are encouraged to support this meaningful endeavour on a continual basis, by providing the necessary time allowance and financial support as incentives for their teachers. Further studies using a robust research methodology to systematically investigate the impacts of professional development on teachers in the soft sciences as well as the resulting effects on student learning, will be interesting, especially if they are conducted in Asian contexts which have received less attention in the research community.

Appendix A: Pre-course survey questions

Adapted from Lee, I. (2010). Writing teacher education and teacher learning: testimonies from four EFL teachers. *Journal of Second Language Writing*, 19(3), 155, with modifications.

- (1) Describe the nature of your school and characteristics of the students.
- (2) How often do you write in English? What do you write about? Do you consider yourself a good writer?
- (3) How did you learn to teach expository writing? When did such learning start?
- (4) What kind of strategies do you use in teaching expository writing?
- (5) How would you evaluate your own instructional practices in the writing classroom?
- (6) List the challenges you face when teaching writing.
- (7) List the difficulties your students encounter in writing expository compositions.

Appendix B: Post-course survey questions

- (1) Did you show an improvement in the understanding of different strategies to teach expository writing during the workshops? Please elaborate your response with examples.

- (2) Did you display an awareness of ways to help students develop coherence in expository writing during the workshops? Please elaborate your response with examples.
- (3) What are your views of the teaching and learning of coherence and expository writing before and after attending the workshops? Please elaborate your response with examples.

References

- Armour, K.M. & Makopoulou, K. (2012). Great expectations: Teacher learning in a national professional development programme. *Teaching and Teacher Education*, 28, 336-46.
- Avalos, B. (2011). Teacher professional development in teaching and teacher education over ten years. *Teaching and Teacher Education*, 27, 10-20.
- Buczynski, S. & Hansen, C. B. (2010). Impact of professional development on teacher practice: uncovering connections. *Teaching and Teacher Education*, 26, 599-607.
- Dórnyczi, Z. (2001). *Motivating Strategies in the Foreign Language Classroom*. Cambridge: Cambridge University Press.
- Garet, M.S., Porter, A.C., Desimone, L., Birman, B.F., & Yoon, K.S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal*, 38(4), 915-45.
- James, M., McCormick, R., and Black, P. (2007). *Improving learning how to learn: Classrooms, schools and networks*. London: Routledge.
- Lee, I. (2010). Writing teacher education and teacher learning: testimonies from four EFL teachers. *Journal of Second Language Writing*, 19(3), 143-57.
- Leinke, J. (1990). *Talking science: language, learning, and values*. Norwood, NJ: Ablex.
- Lieberman, A., & Miller, L. (2008). *Teachers in professional communities*. New York: Teachers College.
- Locks-Horsley, S., Hewson, P.W., Love, N., and Stiles, K.E. (1998). *Designing professional development for teachers of science and mathematics*. Thousand Oaks, CA: Corwin Press.
- McDermott, L.C. & DeWater, L.S. (2000). The need for special science courses for teachers: two perspectives. In J. Minstrell & E.H. van Zee (Eds.), *Inquiring into Inquiry Science Learning and Teaching* (pp. 241-57). Washington, DC: American Association for the Advancement of Science.
- Meiers, M. & Ingvarson, L. (2005). *Investigating the links between teacher professional development and student learning outcomes*. Melbourne: Australian Council for Educational; © 2005 [Accessed 16 May 2012]. Available from: http://research.acer.edu.au/professional_dev/2/
- Opfer, V.D., Pedder, D. G., and Lavicza, Z. (2011). The role of teachers' orientation to learning in professional development and change: A national study of teachers in England. *Teaching and Teacher Education*, 27, 443-53.
- Porter, A., Garet, M., Desimone, L., and Birman, B. (2003). Providing effective professional development: lessons from the Eisenhower program. *Science Educator*, (12)1, 23-40.
- Radford, D.L. (1998). Transferring theory into practice: a model for professional development for science education reform. *Journal of Research in Science Teaching*, 35, 73-88.

Sandholtz, J.H. (2002). In-service training on professional development: contrasting opportunities in a school/university partnership. *Teaching and Teacher Education*, 18, 815-30.

Stein, M.K., Smith, M.S., and Silver, E.A. (1999). The development of professional developers: learning to assist teachers in new setting in new ways. *Harvard Educational Review*, 69, 237-69.

Supovitz, J.A., Mayers, D.P., and Kahle, J.B. (2000). Promoting inquiry-based instructional practice; the longitudinal impact of professional development in the context of systemic reform. *Educational Policy*, 14, 331-56.

Tan, C.H. (2008). The Write Approach: Towards Improving Writing Skills of Normal (Technical) Students. In M.Y. Tan, C. Ho & P. Teo (Eds.), *Teaching, Reading and Writing: Supporting Learners in the English Classroom* (pp. 92-113). Singapore: Pearson Education.

Key Pedagogic Thinkers

Maria Cecília Calani Baranauskas

Roberto Pereira, University of Campinas, Brazil



M. Cecilia C. Baranauskas is a Brazilian Professor and researcher in Human-Computer Interaction (HCI) at the University of Campinas (UNICAMP). She received the ACM Rigo Award (2010) for her lifetime contribution to the Design of Communication field, and became an Honorary Research Fellow at Staffordshire University (UK) in 2001 and a Visiting Fellow at the University of Reading (UK). She is one of the authors of the very first book of HCI in Portuguese, has led several projects in the context of e-Citizenship and e-Inclusion, and has advised more than forty Masters dissertations and PhD theses. Her research interests have focused on HCI issues, particularly investigating different formalisms (including Organizational Semiotics and Participatory Design) in the analysis, design and evaluation of societal systems.

The work that influenced me the most was her social perspective to the design of computing systems, which changed the way I understand technology design, adoption and use (Baranauskas, 2009; Baranauskas and Bonacin, 2008). Named 'Socially Aware Computing', this social perspective also contributed to the way I see and understand human behaviour, organizations and the world.

Baranauskas' approach to design considers three levels in which humans operate and understand the world: the informal, formal and technical. The informal represents the culture, values, habits, beliefs, behavioural patterns

of people and other aspects that are usually difficult to describe, or even identify. The formal represents aspects that are well established and accepted, becoming social conventions, norms or laws. At this level, rules and procedures are created to replace meanings and intentions. The technical level represents aspects that are so formalized that they can be automated or approached in a technical way. Introduced by Hall (1959), these levels were structured by Organizational Semiotics theory (Liu, 2000) in a scheme represented by the Semiotic Onion — see Figure 1.

One of the three levels will always dominate in a given instant of time and, although we deal with them separately, all three are always present in any situation. For instance, in the context of learning, people may learn from observing other people and imitating them (informal); from other's explicit feedback, suggestions, and instructions (formal); or from books, guidelines, and other materials that explain and justify things in a coherently outlined form (technical). It is also possible to perceive the three levels in action when the adoption of technology to foster educational practices is being considered. There are several informal issues at play, mainly the emotional and affective ones, such as students' motivations and teachers' openness to change. There are also formal issues that must be understood and followed, such as the laws, the teaching program, and the students' minimum age. And there are technical issues, which range from choosing the right educational technology (which respects the formal issues and is in conformity with the informal ones) to the physical structure (space, internet access, network security).

Baranauskas brings to the design of computing systems the understanding that any technical system exists in the context of a formal system which, in turn, exists in