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Is the US Plan to Improve Its Current Situation in Science, Mathematics, and Technology Achievable?

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Despite being the inventing country of the Internet, the US is not satisfied with its current state in Internet speed and broadband adoption. Although, more students, teachers and researchers in the US use Internet than any other country in the world, it is not satisfactory for the US educators and legislators to maintain US competitiveness in the achievement of science, mathematics and technology. Another alarming situation is that the mean scores in science and mathematics of US, students are lower than expected. Even with coherent action taken by the government and various institutions, the US cannot produce a sufficient number of experts in science, mathematics and technology fields to meet national and global needs. These situations are not satisfactory for educators and legislators to reach US education goals. To improve this situation, President Obama’s government has taken several action plans. This paper presents a closer look at US science, mathematics and technology education as well as the President’s plan to improve the situation. Conclusions are made regarding whether the US plan is too ambitious as well as whether the vision is comprehensive enough but still possible to execute.

Keywords: broadband adoption, Pell Grants, educational achievement, student assessment, STEM (science, technology, engineering and mathematics)

Introduction

Science and technology have been powerful engines of prosperity in the US since World War II but, currently science, technology and mathematics education as well as the capability of the American workforce are in decline (Leshner, 2009). It seems hard to believe that despite being the inventing country of the Internet, in 2008, the US ranked 15th in broadband adoption among 30 OECD (Organization for Economic Co-operation and Development) nations after being 12th in 2006 (OECD Broadband Portal, 2008). The first and second annual speedmatters.org reports of actual Internet speeds of 50 states in the US did not find any significant improvements in deploying high-speed broadband networks in the last few years. The third report showed that in 2009, 56.5% of the US households (46% rural and 67% urban and suburban) were subscribers to broadband Internet connection (Speed Matters, 2009). In 2006 and 2007, it was 42% and 47% respectively (Levine, 2007). The Pew Internet and American Life Project, 2009 survey report showed that in April 2009, 63% of adult Americans had broadband Internet connections at home, which was 15% higher than the previous year. The broadband Internet service charge was increased from $34.50 in 2008 to $39.00 in 2009 (Horrigan, 2009). However, low cost Internet access could enable lower socio-economic consumers to get new Internet connection.
and existing users to effectively view and download text, audio and video content.

This rate of broadband adoption was not sufficient to reach the Jupiter Research’s projected target of 70% by 2012 (Leggatt, 2007). Compared to the rest of the world, the US ranks 28th in average Internet connection speeds; only nine-tenths of a mbps increase (from 4.2 mbps to 5.1 mbps) since the previous year. At this rate, it will take the US another 15 years to catch up with current Internet speeds in South Korea. According to the report, in 2009, 74.1% of the US population had Internet access. In 2004 and 2007, it was 44.1% and 70.1% respectively. The surveys singled out the high cost of equipment and broadband access as some of the biggest barriers to US broadband adoption. The above information indicates that the US is not improving adequately in broadband deployment, speed and price when compared to other developed countries. This is not satisfactory for educators and legislators who are responsible for the policy and educational priorities needed to maintain US competitiveness in the international arena through continued growth in achievement of science, mathematics and technology.

Studies found that more people in the US used the Internet than any other country in the world and most of them were students and teachers (Fusilier, Durlabhji, Cucchi, & Collins, 2005; YI, 2008). According to a study in 2002, 73% of US college students used the Internet more than the library for research activities. Seventy nine percent of them agreed “that Internet use has had a positive impact on their college academic experience” (Jones & Madden, 2002). Princeton Research Associates for the Pew Internet and American Life Project conducted nationwide telephone surveys, and analyzed how respondents penetrated the Internet. The results showed that all respondents (59%) of the general population did not go through the Internet more than college students (86%) (Jones & Madden, 2002).

Another alarming situation is that the mean math and science scores of US 15-years-olds were also lower than some of the less developed countries, e.g., Czech Republic, Slovak Republic, Austria, Poland and Hungary (TIMSS (Trends in the International Mathematics and Science Study), 2003a; 2003b; 2007a; 2007b). According to the Glenn Commission Report (2000), the current preparation that US students receive in science and mathematics is unacceptable; and as a result, young students in many less-developed countries now outperform their American counterparts in science and mathematics knowledge (National Commission on Mathematics and Science Teaching for the 21st Century, 2000). In 2006, the Program for International Student Assessment reported that 15-year-olds in the US ranked 17th on the science test and 24th on the math test when compared with teens from other 29 industrialized countries (Cavanagh, 2008). The US also trailed at least 19 countries that produced more scientists and engineers. The fact that some less developed countries now perform better in math and science achievement than the US is seen by many US educators, business leaders and politicians as a crisis (Ramirez, 2008).

Another growing concern is that the US is not preparing a sufficient number of students, teachers and practitioners in the fields of STEM (science, technology, engineering and mathematics) education. The US has an excess of English teachers for every job, but cannot find enough qualified mathematics teachers (Golden, 2009). A majority of secondary school students fail to reach proficiency in math and science (Kuenzi, 2008; Olivos-Kah, 2006). This may be because of the fact that many science and math teachers in the US have not majored or minored in these subjects and lack adequate content knowledge. According to the National Science Foundation, the proportion of 24-year-olds who earn degrees in STEM fields in the US ranks 20th in the world. Once being a leader in math and science education, the US is now behind many other countries on several
measures (Kuenzi, 2008). Current progress might be unsatisfactory for executing President Obama’s plans to draw more good teachers to high-need schools, and give more emphasis to STEM education in the US.

The rest of the paper presents a closer look at the US plan for science, mathematics and technology education based on information from President Obama’s campaign speeches and press releases from his advisors after he assumed office in January 2009. The paper ends with some discussion and conclusions regarding the feasibility of implementing the plan.

A Closer Look at US Science, Mathematics and Technology Education

The results of the TIMSS 2007 showed that in science, US fourth-grade students achieved an average score of 539 points, and eighth-graders achieved an average score of 520. In mathematics, the fourth-grade and eighth-grade scores were 529 and 508 respectively, compared with the international average of 500 for these grades and subjects (TIMSS, 2007a; 2007b). In 2003, the average science scores of US fourth-graders and eighth-graders were 536 and 527 respectively; and the average mathematics scores were 518 and 504 respectively (TIMSS, 2003a; 2003b). In 1999, the average science and mathematics scores of US eighth-graders were 515 and 502 respectively (TIMSS, 1999a; 1999b). In 1995, the average science scores of US fourth-graders and eighth-graders were 542 and 513 respectively; and the average mathematics scores were 518 and 492 respectively (TIMSS, 1995a; 1995b). A closer analysis of the studies is shown in Table 1.

Table 1

<table>
<thead>
<tr>
<th>The year of study</th>
<th>Science score</th>
<th>Mathematics score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fourth-grade</td>
<td>Eighth-grade</td>
</tr>
<tr>
<td>1995</td>
<td>542</td>
<td>513</td>
</tr>
<tr>
<td>1999*</td>
<td>-</td>
<td>515</td>
</tr>
<tr>
<td>2003</td>
<td>536</td>
<td>527</td>
</tr>
<tr>
<td>2007</td>
<td>539</td>
<td>520</td>
</tr>
</tbody>
</table>

*Note. In TIMSS 1999 only eighth-graders were tested.

Compared with it in 1995, the average science scores in 2007 for both US fourth-grade and eighth-grade students were not measurably different; however, the average mathematics scores in these grades were slightly higher, 11 points for fourth grade, and 16 points for eighth grade. A superficial reading of this report might mislead the reader to believe that the US is doing well in science and mathematics. However, this would be a mistake since the US is doing far worse in science and mathematics internationally when compared to average scores of many of the students in 35 other countries at fourth-grade level, and 47 other countries at eighth-grade level.

In the US, the 2007 National Assessment of Educational Progress found that 70% of US eighth-grade students performed at or above the basic level in mathematics, and 31% performed at or above the proficient level (Digest from Education Statistics, 2007). Even the US eighth-graders in the best-performing states, such as Massachusetts, ranked significantly lower than the average eighth-graders in the highest-achieving countries, e.g., South Korea, Singapore and Taiwan (Phillips, 2007). In 2003, the performance of US 15-year-olds in mathematics literacy and problem solving, measured by the PISA (Program for International Student Assessment), was lower than the average performance of most of the OECD nations. In the assessment, a greater percentage of US students scored below the average level. And even a lower percentage of them scored
above the average percentage level of OECD countries (National Center for Educational Statistics, 2007). In PISA 2006, the US 15-year-old students ranked 28th in math literacy and 27th in science literacy. Moreover, the US ranked 20th among all nations in the proportion of 24-year-olds who earned degrees in natural science or engineering (Kuenzi, 2008). In summary, when compared to other industrialized nations, the science and mathematics achievement of US students and the rate of STEM degree attainment seem lower than expected for a nation considered the world leader in scientific innovation.

According to a 1999-2000 study on STEM education in the US, administered by SEA (scientists and Engineers for America), many US students are taught by science and math teachers without an undergraduate or graduate major or minor in the relevant fields. Among middle-school teachers, 51.5% of those who taught math and 40% of those who taught science did not have a major or minor in these subjects. Among high-school teachers, 14.5% of those who taught mathematics and 11.2% of those who taught science did not have a major or minor in these subjects (SEA, 2008). According to another 2007 report from the Washington-based Council of Chief State School Officers, only 61% of the nation’s math teachers in grades 7-12 had a major in that subject. In some states, the percentage of math teachers with a college major in math or science is much lower than the nationwide average (Cavanagh, 2008). In high school more than 60% of students in physics and chemistry are taught by teachers without expertise in these fields (Obama, 2009). Due to low remuneration but high accountability and workload, nearly 50% of beginning science and mathematics teachers left their jobs in the first five years (National Science Teachers Association, 2008; Woullard & Coats, 2004). And the problem is going to get worse. A shortfall is projected of more than 280,000 math and science teachers across the country by 2015 (Obama, 2009). Moreover, possibly due to lackluster performance in science and mathematics, Americans are also behind other developed countries in most of the sciences, engineering, architecture, medical science, economics, most of the trades, and many areas of the arts. Experts warned that the US’ apathetic performance in math and science can complicate the troubles of the nation’s already ailing economic situation (Ramirez, 2008).

The US Plan to Improve the Situation

In the past, the US has been able to produce an adequate number of teachers to meet its educational demands (Woullard & Coats, 2004). However, in 2001, Education Week predicted that because of the projected increase in student enrollment, increased teaching workload, high accountability, low remuneration and the integration of technology into the classroom, the US might not have enough teachers to fill the schools (Woullard & Coats, 2004). By 2008, it becomes a reality in science, mathematics and technology education in the US. The current progress is not yet satisfactory. If American educators and legislators are to achieve the US Projection for Education, it would require 4.2 million elementary and secondary teachers by 2017 (Hussar & Bailey, 2008). According to Alan Leshner, the chief executive officer of the AAAS (American Association for the Advancement of Science), and executive publisher of the journal Science, federal research and development had declined in real terms for the past few years before President Obama took office (Leshner, 2009). However, President Obama pledged to double federal funding for public charter schools (increase by $500 million) to upgrade school technology and to award merit pay for teachers, including higher salaries, especially for math and science teachers (Helman, 2008).

The evidence indicates that President Obama has a comprehensive plan to make real changes in the US education system. In one of his election campaign speeches, he offered a dismal picture of the state of
American education. He warned that US elementary school students were not receiving enough instruction in science and math education to compete in the global economy and to obtain advanced STEM degrees. The president elect emphasized that college and university students in the US are lagging behind their Asian counterparts. In a radio address in December 2008, President-elect, Barack Obama, expressed his opinion that in “the country that invented the Internet, it is unacceptable that the US ranks 15th in the world in broadband adoption”. He also added, “Every child in the US should have the chance to get online” (Ash, 2008). He promised to allocate enough money from his “economic-stimulus plan” to place more computers in schools and provide both homes and schools with widespread broadband access (Ash, 2008).

Because of the lack of skilled applicants, a lot of jobs are going unfilled in the US and are being offered to foreigners (Helman, 2008). After being elected, President Obama and his advisors promoted a comprehensive education plan which calls for expanding early education opportunities for all children, providing the opportunity for every child to get Internet access, improving teaching quality, supporting school innovation and putting a college education within the reach of many more students (Helman, 2008).

In a speech he gave on education in March 2009, the President called for linking teachers’ payment to performance, rolling out more charter schools to increase parents’ choices, and closing schools that do not make the grade. In addition, President Obama noted that:

I’m calling on our nation’s governors and state education chiefs to develop standards and assessments that don’t simply measure whether students can fill in a bubble on a test, but whether they possess 21st century skills like problem-solving and critical thinking and entrepreneurship and creativity. (Tucson, 2009)

He proposed training thousands of science and math teachers, boosting early-childhood education, and providing scholarships for those who taught in schools with the greatest needs. He also said he wanted to ensure that state assessments measure higher-order thinking skills (Golden, 2009). It is hoped, this will allow children to be more familiar with the subject matter and to have a chance to take upper level math courses, such as algebra, geometry and calculus, before they graduate. However, he suggested that the first step to accomplish this might be to provide career paths for older workers such as retirees, and people from the military to come back to teach in the nation’s schools. He also declared his plan to encourage young and energetic math and science teachers by giving them better compensation (Leshner, 2009). Moreover, according to Holdren, Obama’s assistant secretary of science and technology and director of the White House Office of Science and Technology Policy:

... The US is capable of sustaining high-quality K-12 science and math programs. We simply are not providing equal educational opportunities for all of America’s children. Now is the time to tackle the science education problem if we want long-term, stable improvements in our national economy and quality of life. (Leshner, 2009)

In an interview with Business Week in March 2009, the US Education Secretary, Arne Duncan, discussed the Obama Administration’s priorities and strategies to improve schools. He agreed that the US has many candidates for jobs in teaching English, but not enough qualified ones in science and math teaching. The secretary thought this is a great problem for the US and he hoped to pay math and science teachers differently. Presumably, this means more. He also expressed the Obama administration’s priorities and strategies on early exposure to more advanced math and science in middle school, rather than late in high school (Golden, 2009).

In another interview in March 2009, Secretary Duncan described in more details the Obama
Administration’s visionary plan for a public school program extension. He envisioned making the US public schools into community centers for the students, teachers, parents and community people by extending school hours (open 12-14 hours a day, 6-7 days a week, and 12 months a year) (Todd, 2009). In the extended school hours, a wide variety of after school activities: arts, sports, chess, drama, debate, music, academic enrichment programs for parents, GED (general educational development), ESL (English as a second language), family literacy nights and potluck dinners could be administered in cooperation with private groups, like the Boys and Girls Club or the YMCA (Young Men’s Christian Association). He expected this to be an effective way to give opportunities to children with two-parent working families or single moms working one or more jobs to achieve their desired goals (Todd, 2009).

On March 26, 2009, US Education Secretary Duncan highlighted Obama’s education budget proposal for FY (Fiscal Year) 2010. It provided for Pell Grants to dramatically increase college students’ access and affordability to financial aid while making them simpler, more reliable and more efficient (Babyak, Bradshaw, & Glickman, 2009). The proposed ARRA (American Recovery and Reinvestment Act) will provide an additional $17 billion for Pell Grants in FY 2009 and 2010; the funding of the current year is $16.2 billion with 6.1 million participating students. With the stimulus package, the Pell Grants would be increased by $500 to $5,350 and be given to 7 million students each year. According to the 2008 Federal Education Tax Benefits Guide, the maximum amount of hope credit in 2008 was $1,800 per student (NASFA (National Association of Student Financial and Administrators), 2008).

Under the new plan, the credit would be raised to $2,500 and it could be used to cover the cost of tuition and textbooks. It is likely that by ensuring affordable and accessible higher education to all American young people, the Obama government wants to make sure that the US is prepared to compete in a technology driven information-age economy. There is hope that, Obama’s proposed budget will call for a historic investment to make college more affordable and accessible and to help more students succeed once they get there. Presumably, a greater number of students attending college with increased middle school and high school preparation in math, science and technology should increase the possibility that more students will also study for and enter careers in STEM fields.

Discussion and Conclusions

Although much of it is not new, Obama’s education plan is imaginative and comprehensive enough to make necessary changes in the US education system if successfully carried out. However, elected on a platform of hope and great changes, President Obama has inherited a horrible worldwide economical crisis, especially in the US and more recently in the European Community, that is having a clear effect on the pace and scale of expected reform. A vital question is whether Obama’s education plan is executable or if it is too ambitious to implement when currently millions of Americans struggle to complete high school, with three in ten dropping out. Moreover, only two of every five American adults have a two- or four-year college degree (Steele, 2009).

According to Donald G. Knezek, the chief executive officer of the Washington-based International Society for Technology in Education, “Obama is the first American President who truly understands and embraces information and communication technology, connectivity and the power of the World Wide Web, and the democratization of information, knowledge, and 21st century communications.” He hoped that the Obama’s Cabinet would make math and science education a national priority, and provide US schools with the
tools to educate 21st century learners (Ash, 2008). Many Americans applaud President Obama for his visionary plan to create standards and assessments that ensure American students to have high content knowledge, e.g., mathematics and science, and the ability to apply that knowledge to be successful citizens, workers and leaders in tomorrow’s world. Although, it is fair to say that public resistance to federal education standards will need to be overcome.

Furthermore, to ensure their goals for lifetime success through education, Obama’s Cabinet, advisors and US educators must take into account what is happening inside classrooms and should consider how the current system of teaching-learning can be improved. A realistic assessment is also needed to determine how the current system can be adjusted to increase its alignment with new and improved science and math curricula and teaching-learning tools to achieve Obama’s ambitious learning goals. An ongoing system should be established to motivate more K-12 students to enroll in more science and mathematics courses. Also, the quality of existing and pre-service science and math teachers in K-12 grades must be improved through better pay, better working conditions, more service training and other work incentives. Definitely, the actual outcome may not be seen for a generation; however, appropriate legislative actions should be taken immediately to open the possibility for changes.

K-12 students, especially in middle schools, should be nurtured and provided with suitable role models and shown practical applications of math and sciences in their lives. They should learn how math and science are related to their non-science and math interests in art, music, fashion or sports. A more widespread use of the STS (science, technology and society) teaching philosophy would be useful for helping make science and mathematics more interesting and relevant to students and perhaps increase the prospect of more middle school students to pursue more science and mathematics in high school (Robinson & Ochs, 2008). However, legislators and educators are not the only people who can solve this problem. US math and science educators must incorporate and welcome the integration of math, science, technology and media experts to work towards a comprehensive education solution. Increased parental support and involvement in K-12 education will also be a key factor.

Like millions of Americans, we hope that Obama’s advisors in education as a whole, and specifically in science, mathematics and technology will find a way to make the public better understand that math, science and technology education are highly valued, respected and essential for all American children, not just for those in selected schools or to prepare students for STEM careers. All of the American society, not just students and teachers, must be involved if we are to remain competitive internationally in science, mathematics and technology driven economic areas. Increased funding for science and math education at all levels, as well as more state and federal research and development will be needed along with more and better trained math and science teachers.

References
IS THE US PLAN TO IMPROVE ITS CURRENT SITUATION


Finding Support in Moodle: A Face-to-Face Chemistry Course for Engineers

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The aim of this paper was to know the students' perceptions of using online support in a chemistry course. To achieve this objective, a qualitative research was conducted over a chemistry course that was imparted in a face-to-face modality using a LMS (learning management system) for online support. The supports available in the LMS were forums, exercises, academic content presentations, readings and course administration activities. Focus groups were used to gather information. The total student population was 42, a non-probabilistic sample was chosen. The results showed that students had never used a learning support system such as the LMS, the platform helped reinforce the course materials and students found the forums particularly useful not only to communicate with the teacher, but also to help and solve other students' questions and share class exercises. Based on the results it is possible to recommend the use of online support for courses at any level, particularly, for those who are taught to freshmen, since in them, they find support and the safety of relying on theoretical-practical materials and the necessary communication to face the introduction to a new educational system.

Keywords: students' perceptions, online support, LMS (learning management system) use

Introduction

The incorporation of technologies into the teaching-learning process is not new, and its definition depends on the approach. Belanger and Jordan (2000) considered three ways that the technologies may be employed in organizations as they evolved through stages: (1) Technology insertion, when the organization is interested in the use of instructional technologies within the traditional classroom environment as a natural first step; (2) Partial conversion, when parts of courses is delivered online or others distance-learning technologies; and (3) Total conversion, the most extensive conversion of traditional classroom training to online or other distance-learning technologies. Meanwhile, Allen and Seaman (2005) considered the percentage of contents taught online and divided courses into four categories: (1) Traditional—Courses without online technologies, and the content is delivered in writing or orally, which means that the proportion of content delivered online is 0%; (2) Web-facilitated—Courses which use web-based technologies to facilitate what is essential for a face-to-face course using a LMS or Web pages to support the learning process, delivering online between 1% and 29% of course content; (3) Blended/Hybrid—Courses that blend online and face-to-face delivery, with substantial proportion of the content delivered online, between 30% and 79%; and (4) Online—Courses where most or all content is delivered online, 80% or more, typically with no face-to-face meeting.

As it is expected, none of the above definitions/divisions implies that one of them is better or worse than...
the rest, because it is implied that is not the use of technology per se that makes the difference but the teaching skills of teachers. Kearsley (1995) indicated that technology amplifies human abilities, so it can help teachers to perform better in their courses, but will not be of much help in the absence of skills and competencies of the teacher, noting that if is to promote effective and efficient use of educational technology, one must pay special attention to items that support excellence in teachers. Currently, most researchers working with online courses, and those using other means, agree that the means by which education is provided—either through chalk and blackboard, or with modern technology, will bring not much differences in the success or failure of the course, and indicate that the predominant factor in designing a successful course is the teaching-learning method used (Clark, 1994; Hiltz, 1993, 1994; McIsaac & Gunawardena, 1996).

In the UABC (University Autonomous of Baja California) México, online education began in 1996, as in most Mexican universities at the time, the institution had no clarity on its implementation and requirements. Its evolution in the UABC has lacked a well-articulated development plan, which has resulted in online courses with very different approaches and teachers with very heterogeneous skills for teaching online. Considering this, to understand any opinions and the result of an online course in the definitions of Belanger and Jordan (2000) or Allen and Seaman (2005), it is essential to know the practices, activities and strategies used by the teacher to incorporate technologies in his/her courses and the context of students as well. This work was carried out in the Engineering Faculty of the UABC Campus Ensenada, Mexico. UABC is the biggest university in the state of Baja California, a Mexican northwestern state bordering the US that has six campuses. The six campuses of UABC together have 45,000 enrolled students, 8,215 of whom study in the Ensenada Campus.

The Engineering Faculty in the Ensenada Campus holds approximately 1,300 students, of these 560 are freshmen or first-year students. In engineering programs during the first year, drop-out is a main issue. Different authors (Abril-Valdez, Román-Pérez, Cubillas-Rodríguez, & Moreno-Celaya, 2008) suggested that the main reasons for leaving college were financial factors, low academic grades and lack of interest. Other studies mentioned that desertion took place because of the difficulty student faced to get used to the new environment that college offers. The main differences found between high school and college were: (1) They need to manage their own time; (2) They need to study more; (3) The reading load is heavier and tougher; (4) There are no reminding about deadlines and tests; (5) Help is available but students have to look for it; and (6) They need to balance work and play among others.

Tutorships at UABC are in place but the role of tutors is to help students balance their academic credits, not to thrive during the adaptation process. There is also a one-week induction course to introduce students to college environment. During this week, they learn where the main buildings and offices are, and they have a welcome speech from the university rector. It is evident that none of these activities help students cope with the list of new issues mentioned above they will face in college. Besides the above-mentioned difficulties for freshmen, one issue could play a crucial role—the use of technologies in their learning process. In UABC, all teachers could have access to a LMS, moodle or blackboard (blackboard is the official LMS) and it is up to the teachers to use it or not in their courses.

In our case, moodle was used as the LMS to support the activities and learning objectives in the first semester chemistry course offered for engineers. The objective of this research was to know the students’ perception of the advantages and disadvantages of using online support in their chemistry course, according to Allen and Seaman (2005), the course analyzed belonged to the Web-facilitated category.
Methodology

The Course

The chemistry course content was covered during one semester that lasted 16 weeks. The total student population of the group was 42, of which approximately 95% came from public schools and their age range was between 18 and 20 years. Ninety-five percent of the group had access to Internet at home, while 100% can access the Internet at campus where computers and Internet connection are available for all UABC students.

The theory and practice sessions were imparted face-to-face in the classroom and in the laboratory respectively. In parallel the course was also organized in a LMS, the platform used was moodle named Sistema de @ulas-UABC. This system allows the instructor to conveniently plan the activities in a weekly fashion, thus it is easy to synchronize the weekly activities performed in the classroom with the ones in moodle.

The supports available for students in the LMS were as follows:

1. Forums for resolution of questions: Through the forums, students can ask any questions that the instructor or any classmate can answer (see Figure 1).

![Forum page for resolution of questions](image)

*Figure 1. Forum page for resolution of questions.*
(2) Exercises for reaffirmation of knowledge: Different types of exercises were used such as fill in the blanks; quizzes among others that were made in hot potatoes software (see Figures 2-5).

Figure 2. Example of a hot potato questionnaire.

Figure 3. Example of a questionnaire showing feedback.
Figure 4. Example of a crossword puzzle.

Figure 5. Example of a matching exercise showing feedback.

(3) Academic content presentations seen in class—Each theory class had a PP (power point) presentation that covered the content of that day, and these presentations were uploaded to the LMS for the students to
review (see Figure 6).

Figure 6. Page showing hyperlink to open a PP presentation.

(4) Readings—All theory readings were also available in the LMS for the students to download or review online (see Figure 7).

Figure 7. Page showing an Acrobat file related with the course content.
(5) Course administration activities—These included delivery of grades; push information posted in forums to their e-mail about new materials in the system; deadlines for homework and tests dates among others.

Two way communication by the way of forums or the instant message module: Students can communicate with the professor or any other classmate in a more private way. Moodle allows seeing who is online with the possibility to interact in real time. This allows shy students to solve doubts or communicate any other issue they do not feel comfortable in front of the class.

All the activities mentioned above and the communication modules were available during the semester. In this way, whatever was missing in class could be solved in the LMS, if a student was absent in one or more classes he/she could know and study the themes covered in those days. All important dates, deadlines and activities were also available. The students had all the materials and lab practices in advance so they could prepare and read before the theory and lab sessions. The students were told that they have to upload their homework through the LMS and that the hot potatoes exercises were part of their grades. In UABC, it is mandatory to have at least two partial tests during one course, which were performed in classroom, but the grades and feedback about the results were uploaded in the LMS. In this way, students could be informed and be certain about their advancement in the course.

Students Records Analysis

To get an idea of the intensity of use of online content and activities, the records of the actions taken by students were analyzed as a whole without seeking an individual or analysis per student. Although these records include all activities undertaken by students in the LMS, in spite of its relevance to their learning, it allows identifying the intensity of the use of different resources and activities available.

For the activities analysis, the types of actions were divided into three categories depending on their nature: course information, interaction and course activities. Course information included syllabus, grades and actions related with course information. Interaction included a forum for questions and assignments and a forum for social interaction. Course activities included actions related with contents such as presentations, readings, exercises, online hot potatoes quizzes and homework.

Interviews

We used focus groups to gather information about the students’ attitudes towards the use of LMS as a learning support tool. According to Fontana and Frey (2000) and Madriz (2000), focus groups are a powerful means to evaluate services or test new ideas. Basically, focus groups are interviews of 6-10 people at the same time in the same group. It is possible to get a great deal of information during a focus group session.

The researchers chose a non-probabilistic sample with three strata, each stratum composed by eight students of high (group A), average (group B) and under performance students (group C) respectively based on the students final grades. We interviewed a total of 24 students and used an interview guide, and each group was interviewed separately. To avoid intimidation, none of the interviews were carried out by the chemistry professor but by experienced postgraduate students. Seven questions were asked in an informal and interactive group setting where participants were free to talk with other group members. The interviews were recorded; afterwards all comments were transcribed and analyzed.

The questions used to guide the interviews were as follows:

(1) What is your view that the teacher used a Website to support the chemistry course? Were the dynamics and contents of the classroom articulated with the content and activities on the site?
(2) Did the use of the LMS influence (positively or negatively) your academic performance?
(3) What were the main advantages and disadvantages of using a LMS in the chemistry course?
(4) How many times a day, week or month did you log on the course site? What is the reason of the frequency?
(5) What would you like to change or add to the site to facilitate or encourage a more efficient learning process?
(6) Were there any difficulties to use the site? What are they?
(7) What was it that you like most and least of the activities or contents that the teacher put on the site?

The interviews took place at the end of the semester just one week after completing the final requirements of the chemistry course.

Results

Record Analysis

After 16 weeks, the course accumulated 108 actions in the three categories (containing eight different sub-categories) with a total of 10,919 records as shown in Table 1. The category under the name of “course activities” had the majority of actions in the course and naturally most of the records. Although “interaction” category had only two types of actions (two forums), this category accounts for the second largest number of records. It seems that “course information” was not as popular comparatively with the other categories.

Table 1

<table>
<thead>
<tr>
<th>Category</th>
<th>Type of actions</th>
<th>Number of actions</th>
<th>Action per category</th>
<th>Records</th>
<th>Records per category</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course information</td>
<td>Syllabus</td>
<td>12</td>
<td>16</td>
<td>180</td>
<td>510</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Grades</td>
<td>4</td>
<td>3</td>
<td>330</td>
<td>82.5</td>
<td></td>
</tr>
<tr>
<td>Interaction</td>
<td>Forum about questions about assignment</td>
<td>2</td>
<td>3</td>
<td>746</td>
<td>5,190</td>
<td>373</td>
</tr>
<tr>
<td></td>
<td>Forum for social interaction</td>
<td>1</td>
<td></td>
<td>4,444</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course activities</td>
<td>Presentations and readings</td>
<td>55</td>
<td>103</td>
<td>1,433</td>
<td>5,319</td>
<td>26.05</td>
</tr>
<tr>
<td></td>
<td>Exercises</td>
<td>8</td>
<td></td>
<td>264</td>
<td></td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>* Online hot potatoes quizzes</td>
<td>12</td>
<td></td>
<td>2,314</td>
<td></td>
<td>192.83</td>
</tr>
<tr>
<td></td>
<td>* Homework</td>
<td>14</td>
<td></td>
<td>1,208</td>
<td></td>
<td>86.29</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>108</td>
<td></td>
<td>10,919</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. * Mandatory activities by the course design.

As we can see, presentations and readings alone account for half of the activities in the course, and the access to such resources accounts for 1,433 records, only below to the 2,314 records in online hot potatoes quizzes in the category, which was an activity expected to be superior, because it is related with grades. The relative high value in homework activities is also related with the online delivery (see Table 1).

As shown in Table 1, the use of forums was the most popular activity, especially the one related with
social interaction with 4,444 records.

In Figure 8, we can appreciate the differences between the three categories considering all the records, with “course activities” as the most important of the three, flowed by “interaction” and “course information”.

![Figure 8](image)

Considering only optional actions (not mandatory by the course design) and directly related with the course dynamics, it is evident that “social interactions” played a major role on students along with presentations and readings. On the other hand, “syllabus”, “grades” and “exercises” played a marginal role.

**Interviews**

The opinions and statements expressed in the three focus groups (A, B and C) showed no marked differences between them. Students of the three groups agreed that the LMS was very useful for them. The main advantages mentioned (in their own words) were:

- It was very practical since I could re-affirm the themes seen in class;
- It was easier to follow the professor’s explanations since I did not have to take notes; the PP presentation was in the course site;
- If I forgot an activity of the course, I could go to the site and review the calendar of activities;
- Lots of support materials and examples;
- The class was less monotonous using the course Website;
- It was possible to correct the exercises and (through the feedback) see what I have done wrong;
- It was good to know in advance what we will do in the laboratory sessions. We could prepare and read;
- We knew exactly how our performance was progressing because we had our grades and feedback from the professor;
- Every day we check our personal e-mails, so it was easy to make a routine on going to the site of the chemistry course;
- It was easier to study because all the materials needed were there;
- It was like being in Face book.
Only groups B and C mentioned some disadvantages on the use of the LMS, the disadvantages mentioned were:

- At the beginning, it was difficult to register into the site;
- Sometimes I did not pay attention in class, because I knew the professor would upload the presentation to the site;
- In occasions, some exercises did not show in Firefox but they did in Explorer, thus we had to change browser;
- It was easy to cheat the exercises, because you could ask for clues and then solve the entire exercise.

The three groups found articulation between the themes seen in classroom and the exercises, readings and games covered in the LMS. The three groups also agreed in that the use of the LMS helped them cope with the newness of the university environment because they felt supported all the time. They mentioned that they had the feeling that “somebody” (the chemistry professor) was there for them all the time even though he/she was virtually there.

Groups A and B mentioned that they logged on in the course every day, while group C mentioned that they logged on only twice a week or when the professor ask for a special homework.

The three groups agreed that the LMS was very useful not only for the chemistry course but also for other courses as well. They used the forums for delivering information and readings from other courses and for social activities. They even mentioned that they would really like to have a site like this in all the other courses they had.

In general, the three groups mentioned that the LMS helped them to stay attuned in the course or other courses. The three groups also agreed that the chemistry course was their first experience using a LMS.

Discussion and Conclusions

From the earliest years of the 1990s, it has been documented that the predominant factor in designing a successful course is the teaching-learning method used (Hiltz, 1993, 1994; Clark, 1994; McIsaac & Gunawardena, 1996), so that the use of technology per se is not the most important factor, but the importance not only considering the tools used but also the teacher practices. For these reasons, the definitions of blended courses are usually so general and broad that they only help us identify if the course is intended for replacement for face-to-face instruction or as an enhancement of the face-to-face learning experience. The relevant aspect here is the practices that enrich the blended course.

A review of Table 1 allows us to state that the course is not only a space with static information, but also a course with strategies that encourages student-to-student, student-to-teacher and student-to-content interactions. Based on the number of interaction records, it is clear that the level of student-to-student and student-to-teacher communication (mainly student-to-student) promotes positive perceptions towards the course and the teacher. At the same time, this leads to decreasing the transactional distance as proposed by Moore (1997). He argued that distance was determined by the amount of dialogue between actors and the level of course structure, with higher transactional distance in very structured courses with little dialogue, which did not apply in this course. Along this same line of argument, Saba and Shearer (1994) argued that transactional distance decreased when the students felt in control of their actions in the course.

Based on feedback gathered through focus groups, it is possible to say that the use of LMS in the chemistry course was very useful not only for course activities but also as a source of support and interaction for freshmen. This is evidenced by the number of records mainly in the social forums and, according to what students mentioned, the site was also used to send jobs and messages from other courses in addition to the social interaction that occurred to them. These results reflect the desire to have this type of support tools in other courses.
The opinions expressed by students about the benefits and advantages of participating and the will to continue participating in a course with the characteristics presented in this study are consistent with authors such as Horton and American Society for Training and Development (2001), Palloff and Pratt (2003), McGill and Hobbs (2008) and Dunlap et al. (2008) among others who mentioned that if students were satisfied with their online course, they were more likely to stick with this modality. Other factors that reinforce the positive perception of the course was the extensive use of forums for interaction and the teacher support perceived by students (Clulow & Brace-Govan, 2000; Harasim et al., 1995; Hiltz, 1993, 1995, 1997; Abbey, 2000).

Another result that matches with the interviews is the number of records in activities such as hot potatoes. Students mentioned that they liked these exercises. This is positive because each exercise was solved individually using the LMS system and students received feedback in case they needed help. This is not always possible in the classroom either by the shyness of some students or because of the size of the group or class time.

Having the class materials and presentations at any time was an advantage mentioned by the three groups analyzed, and this was confirmed by the number of records in the sub-category of presentations and lectures. The availability of this information in the LMS avoided visits to the library which would have involved more time dedicated to this course.

Today, the use of technology in education is not questioned. It is increasingly common to use it at the different educational levels, but in Mexico, the use of technology for learning in higher education is not the usual practice, thus it is not surprising that none of the students in the course analyzed had previous experience in the use of LMS. However, since students are familiar with the Internet and other networks of social interaction, using the course site is not difficult for them. In the specific case of UABC, it would be more appropriate that more professors use LMS to support their courses, because besides helping their students (as is discussed above), it helps to improve their teaching practices, organize class materials and better distribute in time the different themes and activities.

It can be concluded that LMS is an essential resource for students, especially for freshmen, in large part because of the communication opportunities and the support they have in a new environment. These benefits include learning about the college, classes and study skills. In addition, students build important relationships with professors and peers.

Learning technologies are being used to enhance students’ opportunities and provide flexibility and learners’ choices. The authors, therefore, emphasize blended approaches that combine face-to-face and technology-supported learning. It must be highlighted however that using a LMS for the first time for teaching can be time-consuming and requires a degree of commitment on the part of the lecturer.

The approach followed in this work brings a new look to the learning tools most preferred by students and discusses the advantages and disadvantages they found in a LMS in order to improve the class support system. The results could be useful for freshmen teachers and researchers who want to improve group performance using online activities. Using a LMS such as moodle allows performing a more in depth analysis to find relationships between the number of registers per student and grades. This would bring more insights into the results presented here.

References


The Design and Development of a Context-Rich, Photo-Based Online Testing to Assess Students’ Science Learning*

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This study designed and developed a CP-MCT (content-rich, photo-based multiple choice online test) to assess whether college students can apply the basic light concept to interpret daily light phenomena. One hundred college students volunteered to take the CP-MCT, and the results were statistically analyzed by applying \( t \)-test or ANOVA (Analysis of Variance). Using the results obtained in this study as working examples, we continue to discuss the instructional applications and the educational implications of the CP-MCT. The CP-MCT was shown to overcome some shortcomings of the traditional MCT, while maintaining its advantages in terms of cost and time efficiency as well as the ease to administer. Moreover, with the usage of a free Website (retrieved from http://www.my3q.com), it relieved the burden of school teachers worrying about the techniques of implementing an online testing. The idea of CP-MCT can be applied in the pre-service and in-service teacher education to train the teachers in the design and development of the CP-MCT to assess their students’ science learning.

Keywords: content-rich, photo-based, online testing, assessment, science learning, light concept

Introduction

Research studies on science learning and teaching have been a prominent area in science education research in the past few decades (National Research Council, 2007). In the course of science learning, it is easy for students to form and hold misconceptions, either prior to or after formal instruction. Furthermore, they are tenacious to change and may interfere with formal science teaching and learning. As far as science instruction is concerned, it is important for science teachers to detect and identify students’ misconceptions, so that they can help students correct the misconceptions in time. There were many assessment methods developed to identify students’ misconceptions in science, such as predict, observe and explain (White, 1982); the interview-about-instances (Osborne & Gilbert, 1980); the interview-about-events (Schollum & Happs, 1982);
DESIGN AND DEVELOPMENT OF A CONTEXT-RICH, PHOTO-BASED ONLINE TESTING

class concept map (Ruiz-Primo, 2004); concept cartoon (Stephenson & Warwick, n. d.) and two-tier diagnosis test (Treagust, 1988) etc.. Other assessment methods involved pencil and paper tests such as multiple-choices or those described by Stead and Osborne (1980), Karrqvist and Anderson (1983), and Eaton, Harding, and Anderson (1985). Online test has also been used as a way of science assessment. An example prepared by the NWEA (Northwest Evaluation Association) can be seen in http://www.nwea.org/assets/documentlibrary/Science_single.pdf. Although these assessment methods were effective in diagnosing scientific misconceptions, they seemed to be time consuming and difficult for untrained teachers to prepare and use, so they were not popular in the science classrooms yet.

Hence, many school teachers are still used to applying traditional tests (such as multiple-choices, fill-the-blank, short answer or short essay, etc.) to assess the outcomes of students’ science learning. Students answer the tests by selecting an item or recall information to write the answers. These tests may be standardized by governmental or private agencies or created by school teachers (retrieved from http://jonathan.mueller.faculty.noctrl.edu/toolbox/whatisit.htm). Among these formats, MCT (multiple-choices test) was used frequently because they were less time consuming and also relatively easy to validate and determine the internal consistency (Taylor & Watson, 2000). Many MCT formats were text-based, and were generally accompanied with simplified diagrams, sketch of figures, or formula to illustrate abstract science concept or to test students’ understanding of scientific concepts. Those formats had some drawbacks. For example, students may not be familiar with the scientific terminology (Wang & Guo, 1992), the formula was too abstract for students to understand and make sense (Popov, Zackrisson, & Olofsson, n. d.). Also, they tended to be context-free, without the connections to the daily phenomena. Some students who did well in the MCT failed to learn how to interpret the daily phenomena by applying basic scientific concepts learned in the science classrooms.

In short, traditional MCT has its disadvantages. Firstly, the test is focused more on abstract science concept which mostly is context-free without a good linkage with the daily life experience. So, students usually cannot apply what they have learned in the classroom to interpret daily phenomena. Secondly, test results generally do not provide enough information regarding to what kind of misconceptions students might have. Thirdly, students who are good at taking tests may make good scores without a true understanding of the science concept (Shepard, 1989). Fourthly, the test results are often recorded as scores or ranking to differentiate students’ abilities, but teachers move on without making much change in the future instruction (retrieved from http://www.encyclopedia.com/doc/1G1-111616029. html).

Yet, the development of a teaching approach to help students clarify their misconceptions and bring about conceptual change was important for teachers to plan for the future instructions (Fetherstonhaugh, Happs, & Treagust, 1987; National Research Council, 2007). Bell (2007) also pointed out that the classroom assessment of science learning was to help school teachers to understand and enhance students’ learning. It seemed that the traditional MCT cannot help teachers pinpoint students’ science misconceptions, and it did not really provide enough hints for teachers to enhance students’ science learning. It seemed that the traditional MCT cannot fulfill the aim of science classroom assessment, in terms of providing feedbacks to help further learning.

Thus, the researchers are motivated to twist the traditional MCT somehow to meet three goals. Firstly, we want to design and develop a CP-MCT that closely related to the daily phenomena, so school teachers can use it to guide students to interpret the phenomena by applying their basic scientific concept. Secondly, the answer choices of CP-MCT will correspond to what kinds of misconceptions students hold. Thirdly, it would still be easy to administer and be time efficient.
To illustrate the main ideas involved in the design of CP-MCT, we chose light concept as the theme to make a demonstration. Light is a common natural phenomenon that can be seen in the physical world on a daily basis. Light concept is crucial to be learned as part of the requirement for science literacy that was illustrated in science for all Americans (Rutherford & Ahlgren, 1990). Most schools taught light concepts since elementary schools, but many students at different school levels held alternative conceptions of light regardless of countries and cultures. Moreover, these alternative conceptions influenced students’ future science learning (Fetherstonhaugh et al., 1987).

In Taiwan, non-science major college students only learned physics up to junior high school. We wonder whether college students still remember the basic light concepts (such as the propagation, reflection, refraction of light, the shadow formation, etc.) learned in junior high school and be able to apply these concepts to explain the daily phenomena relevant to light regardless of their majors. Therefore, this study designed and developed a CP-MCT as an assessment instrument, and investigated some science major and some non-science major college students to see if they could apply the basic light concept to explain the daily phenomena associated with light. Based on the test developed, the research questions were as follows:

1. Can college students interpret the daily phenomena properly by applying basic light concepts?
2. Did the background of the sample students make a difference on their test results?

**Literature Review**

**Scientific Concept and Students’ Misconception of Light**

In this study, we addressed three light concepts such as light propagation, shadow formation, and the scattering of light. The scientific interpretations of these three light concepts were: (1) Light emits from the light sources and travels in straight line; (2) When light encountered some opaque objects, it cannot come through and forms shadows of such objects. Shadows are similar to the shape of objects, and they do not have the same quality, color or line/grains as the corresponding objects; and (3) The reflection or scattering of light from a rough surface is related to its surface structure and other special features.

There are abundant literatures regarding to the study of misconceptions of light. Wang and Guo (1992) studied the optics concept of eighth and ninth grade students and found the following results: (1) Students used “propagation of light along straight path, refraction and projection” to explain the propagation along straight path and the reflection of light, such as shadow, image of formation by pinhole, image formation by mirrors, seeing the objects, etc.; (2) The concepts of real image were generally confused with virtual image; and (3) Students’ misconceptions about refraction (such as light going from air to water) were very common. Students understood that water bends the light but they were unable to specify its direction (retrieved from http://dorise.sec.ntnu.edu.tw/JCSE/paper_detail.php?pid=037119920000030073). Stead and Osborne (1980) administered a survey with 144 students (12 years old) who did not study light in the previous 12 months, and with 235 students (13 years old) who had recently studied a unit of light. Results indicated that both groups held similar views. Most children recognized objects that were sources of light. Some children thought that light did not travel at all. Many students figured that light was only present if observable effects were witnessed. Some learners thought that seeing was an active eye process with something leaving the eyes. We designed and developed the answer choices of our innovative CP-MCT by using the scientific concepts as the correct answers and misconceptions as distracting answer choices.
Assessment Tools for Analyzing Alternative Conception of Light

Wang and Guo (1992) designed and used a multiple-choice test for probing junior high school students’ misconceptions in optics. Chen, Chang, and Guo (2004) designed and developed a diagnostic instrument to investigate students’ alternative conceptions of reflection and refraction of light. Both instruments mentioned above were designed carefully based on solid literature reviews. However, they were text-based and with some diagrams or sketch of figures to test students’ misconceptions. Stephenson and Warwick (n. d.) used concept cartoons to support progression in students’ understanding of light. Huang (2005) designed and developed a two-tier diagnosing system to analyze students’ misconception of light. Lau (2006) designed and developed a scientific cartoon material to discuss with students about the misconceptions of light shown in the cartoon. Those assessment instruments were useful in assessing students’ misconceptions, but they were not designed or developed to assess students’ interpretation of the daily phenomena by applying basic light concept.

Methods

The rationale of the design and development of the CP-MCT assessment instrument was based on two ideas: “They deal with phenomena that are authentically observable” and “They are used to assess students’ interpretation of the daily phenomena by applying light concepts”. Each test item is consisted of a question and a picture together with a set of answer choices which were made based on the literature reviews that reveal students’ misconception of light in certain aspects. Hence, the teachers can identify students’ categories of misconception based on the answer choices they made. The idea is similar to the concept cartoon except that there were no characters arguing different viewpoints in this photo-based online testing.

There were totally five CP-MCT questions (see Appendix). Question 1 is a simple picture to assess the concept of shadow formation. Question 2 is another example of how sunlight comes through an anti-typhoon board of the window to make shadows on the white board inside the room. It also involves the reflection of light from a smooth surface. Questions 3 deals with the forming of shadows and how the coarseness of the surface and material influence the lightness or darkness of the stone. Questions 4 and 5 are related to the phenomena seen in the water surface and sea surface. Students need to understand that since there are ripples and wavelets on the water and sea surfaces, the resulting reflection of light is unsteady and not unidirectional.

The sample included 100 college students who volunteered to answer those questions in a Website (retrieved from http://www.my3q.com). This Website was free to use, and allowed users to upload the pictures associated with the multiple-choice questions and a set of answer choices. The Website provides an automatic feedback to the users by calculating the descriptive statistics and drawing pie charts with regard to the numbers of persons on each item chosen. It is very powerful and convenient to use, the users (such as school teachers) do not have to worry about the technical side of the online testing. So, it is easy to administer as well as cost and be time efficient for school teachers to implement their CP-MCT. The results of this online CP-MCT were used to conduct statistical analysis including frequency, t-test, and ANOVA to find out whether there were any significant differences among samples that had different backgrounds.

Results

Frequency of Answer Choice Made in Each Question

The frequency and pie charts of the sample’s answers to the questions can be seen in the right-side of each CP-MCT as shown in appendix. The concept tested in question 1 was a simple concept about shadow formation of
a plant pot under the sun, and the correct rate was 93%. Question 2 was not a familiar example of shadows formation as usually shown in the textbook. It required students to apply their basic light concepts regarding to “light travel in straight line, and when it encounters some opaque objects, it can not come through and form shadows of such objects”. The correct rate was 82%. Question 3 tested on the concept about light reflection on a rough and coarse surface of a stone. The correct rate was 87%. Question 4 required the application of “light scattering” concept by a rippling water surface to interpret the reason why the tree shadows in the pond were hazy. To our surprise, the correct rate was only 61%. Question 5 asked why the sunlight appeared to blink on the sea surface during sunrise. Students should understand that it was caused by the scattering of sunlight by the sea wavelets, a result indicating that light was reflected in different directions by the waver sea surface. The correct rate of question 5 was 74%. The lower performance in questions 4 and 5 may be due to the unfamiliarity of the examples that were not commonly seen in the textbooks, or it may be due to the fact that students did not know how to interpret the daily phenomena using the light scattering concept learned previously.

**Differences of the Test Results Due to Students’ Background**

We applied t-test to investigate if “taking freshman physics”, “gender” and “majors” influenced the test outcomes. In the data analysis, if a student answered a question correctly, it would be scored as 1 for that question. Otherwise, it would be scored 0. From Table 1, it was shown that gender did not make a significant difference among the samples. However, “taking freshman physics” made significant differences on questions 1, 3, 4 and 5, while “majors” made significant differences on questions 1, 3, and 4. The probability value (called p-value and will be abbreviated as p hereafter) of a statistical hypothesis test is equal to the significance level of the test for which we would reject the null hypothesis. The p-value is compared with the actual significance level of our test and, if it is smaller, the result is significant. That is, if the null hypothesis were to be rejected at the 5% (or 1% or 0.1%) significance level, this would be reported as “p < 0.05”, or “p < 0.01” or “p < 0.001” respectively.

Table 1

<table>
<thead>
<tr>
<th>Question</th>
<th>Taking freshman physics? Mean (standard deviation)</th>
<th>Gender Mean (standard deviation)</th>
<th>Science or engineering major? Mean (standard deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question</td>
<td>No N = 58  Yes N = 42</td>
<td>t p</td>
<td>Male N = 45 Female N = 55</td>
</tr>
<tr>
<td>1</td>
<td>0.86 (0.35) 1.00 (0.00)</td>
<td>-3.02 0.00***</td>
<td>0.96 (0.21) 0.89 (0.31)</td>
</tr>
<tr>
<td>2</td>
<td>0.81 (0.35) 0.86 (0.35)</td>
<td>-0.61 0.54</td>
<td>0.89 (0.32) 0.78 (0.42)</td>
</tr>
<tr>
<td>3</td>
<td>0.79 (0.41) 0.95 (0.22)</td>
<td>-2.52 0.01**</td>
<td>0.91 (0.29) 0.82 (0.39)</td>
</tr>
<tr>
<td>4</td>
<td>0.47 (0.50) 0.81 (0.40)</td>
<td>-3.82 0.00***</td>
<td>0.71 (0.46) 0.53 (0.50)</td>
</tr>
<tr>
<td>5</td>
<td>0.62 (0.49) 0.86 (0.35)</td>
<td>-2.80 0.01**</td>
<td>0.80 (0.40) 0.65 (0.48)</td>
</tr>
<tr>
<td>Total</td>
<td>3.55 (1.11) 4.48 (0.67)</td>
<td>-5.17 0.00***</td>
<td>4.27 (0.86) 3.67 (1.12)</td>
</tr>
</tbody>
</table>

Notes: * p < 0.05; ** p < 0.01; *** p < 0.001.

Since the questions only required basic light concept, it did not make significant differences regarding
physics credits taken among samples as shown in Table 2. As long as students remember the basic light concept about the propagation of light, the formation of shadows, the reflection and refraction of light, and the scattering of light, they can do well in this test.

Table 2
ANOVA Analysis With Regard to Numbers of Physics Credits Taken

<table>
<thead>
<tr>
<th>Item</th>
<th>Physics credits taken</th>
<th>ANOVA</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (standard deviation)</td>
<td>F (pr)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 credit</td>
<td>1-3 credits</td>
<td>4-9 credits</td>
<td>More than 10 credits</td>
<td></td>
</tr>
<tr>
<td>N = 43</td>
<td>N = 24</td>
<td>N = 25</td>
<td>N = 8</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0.86(0.35)</td>
<td>0.92(0.28)</td>
<td>1.00(0.00)</td>
<td>1.00(0.00)</td>
</tr>
<tr>
<td>2</td>
<td>0.81(0.39)</td>
<td>0.83(0.38)</td>
<td>0.80(0.41)</td>
<td>1.00(0.00)</td>
</tr>
<tr>
<td>3</td>
<td>0.81(0.39)</td>
<td>0.79(0.41)</td>
<td>0.96(0.20)</td>
<td>1.00(0.00)</td>
</tr>
<tr>
<td>4</td>
<td>0.51(0.51)</td>
<td>0.67(0.48)</td>
<td>0.72(0.46)</td>
<td>0.63(0.52)</td>
</tr>
<tr>
<td>5</td>
<td>0.70(0.46)</td>
<td>0.79(0.41)</td>
<td>0.64(0.49)</td>
<td>0.88(0.35)</td>
</tr>
<tr>
<td>Total</td>
<td>3.70(1.12)</td>
<td>4.00(0.98)</td>
<td>4.12(1.05)</td>
<td>4.50(0.53)</td>
</tr>
</tbody>
</table>

Discussion

The primary purpose of this study is to show the feasibility of using CP-MCT to diagnose students’ misconceptions in science, using light concept as an example. Bearing in mind that the test developed in this study is meant for finding if students can interpret the daily phenomena by applying basic light concept. If not, what are their misconceptions? Since the participants of this test are college students, it is understandable that most students got the answers right on the application of light propagation and shadow formation. However, questions regarding light scattering in freshwater and seawater (questions 4 and 5 respectively) seemed harder for the college students no matter how many physics credit hours they took before.

The CP-MCT is easy to administer because of the free Website (Retrieved from http://www.my3q.com). It is time efficient because this Website provides the basic descriptive statistics for the users, and it saves school teachers a lot of time in grading and getting a quick picture of the test results. It is also a powerful diagnostic tool for school teachers to understand what kind of misconception students had because the distracters in each test item were made based on a careful literature review. Moreover, it is also handy for school teachers to test if students really understand the basic light concept and to interpret the daily phenomena associated with light. Many students understand the terminology of physics, and they have the skills to apply formula to solve complicate physics questions shown in a text-based test. However, they may not be able to interpret the daily phenomena associated with light by applying the basic light concept.

Besides the current study focused on the light concept, the application of CP-MCT can also be applied in other subjects that are consisted of context-rich daily phenomena such as geosciences. For example, teachers can take a picture of mudflow after typhoon to assess if students can explain what causes the landslide. Moreover, the teachers in fine art may find it feasible to assess students’ understanding of how the artist plays with light reflection and refraction in an oil picture. However, there are certainly limits on CP-MCT, because it is only good for the daily phenomena that can recorded by a camera (digital or regular). Something that is too abstract, too small or too big may not be suitable for this type of assessment instrument. However, there are so many daily phenomena associated with scientific concepts which can be done with CP-MCT. It will be still a powerful tool for school teachers to use to understand how well their students can apply the basic scientific
concept to interpret the daily phenomena.

**Educational Implication**

This study proposed a CP-MCT to overcome some shortcomings of the traditional MCT. With the availability of existing research findings on students’ misconceptions, it proves to be a very powerful tool for identifying students’ misconceptions in science. Prudent use of CP-MCT by science teachers is expected to lead to better science instruction. Of course, the usage of CP-MCT is not limited to any particular subject such as physics. It can be easily applied to other subject areas in science or even visual arts. It still keeps the advantages of the traditional MCT in terms of cost and time efficiency and the ease to administer. Moreover, with the free Website (http://www.my3q.com), it waives the worry about techniques of implementing an online testing. The idea of CP-MCT can also be applied in the pre-service and in-service teacher education to train the pre-service and in-service science teachers for designing and developing the CP-MCT to assess their students’ science learning.

We will recommend school teachers to try out the ideas proposed in this study as well as trying to use any network resources that can relieve the burdens in teaching and assessment. However, the making of answer choices based on a careful survey about the misconception literature reviews may be too much work for school teachers to fulfill in their busy schedules. It is best that a national or international organization takes the responsibility to handle the preparation of the tests. It would be even better that certain Website (similar to the concept of Wikipedia) would attract school teachers at different school levels to share the good works of CP-MCT among the Web-based teacher community.

**References**


DESIGN AND DEVELOPMENT OF A CONTEXT-RICH, PHOTO-BASED ONLINE TESTING


Appendix: A Context-Rich, Photo-Based Multiple Choice Test

<table>
<thead>
<tr>
<th>Question 1: Sun irradiated on a plant pot, how would a shadow be made?</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Image of a plant pot with sunlight and shadows]</td>
</tr>
<tr>
<td>Answer Choice 1: (93%) Light traveled in a straight direction. Some sunlight was blocked by the plant pot, and some sunlight went through the slits among leaves and made shadows.</td>
</tr>
<tr>
<td>Answer Choice 2: (0%) When sunlight illuminated on the leaves, it conducted photosynthesis to make shadows.</td>
</tr>
<tr>
<td>Answer Choice 3: (3%) The plant pot was not transparent, so it projected shadows on the same side as the sun.</td>
</tr>
<tr>
<td>Answer Choice 4: (4%) Light traveled in curved path according to the shape of the plant pot, and it projected shadows.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 2: What happened to the white board inside the room when sunlight came through the anti-typhoon board in the window?</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Image of a white board with sunlight and shadows]</td>
</tr>
<tr>
<td>Answer Choice 1: (4%) Sunlight made a turn to come through anti-typhoon board and illuminated on the white board.</td>
</tr>
<tr>
<td>Answer Choice 2: (14%) The anti-typhoon board blocked the sunlight that cast its shadows on the white board.</td>
</tr>
<tr>
<td>Answer Choice 3: (82%) Light travels in a straight line, and the part of the whiteboard blocked by the anti-typhoon board was darker, while the other part was lighter.</td>
</tr>
<tr>
<td>Answer Choice 4: (0%) When there was strong sunshine outdoors, light irradiated into the room and cast its shadows on the white board.</td>
</tr>
</tbody>
</table>

(to be continued)
Question 3: What happened when sunlight illuminated on the coarse surface of the stone?

<table>
<thead>
<tr>
<th>Answer Choice 1: (2%)</th>
<th>Light stayed on the stone surface because it did not go through, or be reflected or be absorbed by the stone.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answer Choice 2: (87%)</td>
<td>The extent of coarseness of stone surface and the angle of illumination influenced the darkness of the stone surface.</td>
</tr>
<tr>
<td>Answer Choice 3: (2%)</td>
<td>A stone was not similar to a mirror that reflected the images of objects, so there was no light reflection on the stone.</td>
</tr>
<tr>
<td>Answer Choice 4: (2%)</td>
<td>Some parts of the stone were darker because it did not absorb or transform light energy.</td>
</tr>
<tr>
<td>Answer Choice 5: (7%)</td>
<td>The material of the stone was hard, and the surface of the stone was rough and uneven, so it did not reflect light well.</td>
</tr>
</tbody>
</table>

Question 4: Why the tree shadows in the pond were hazy?

<table>
<thead>
<tr>
<th>Answer Choice 1: (15%)</th>
<th>It was due to the refraction of light on the water surface.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answer Choice 2: (61%)</td>
<td>It was caused by the wavelet that scattered the light.</td>
</tr>
<tr>
<td>Answer Choice 3: (24%)</td>
<td>It was so because the angle of incidence was not the same as the angle of reflection.</td>
</tr>
<tr>
<td>Answer Choice 4: (0%)</td>
<td>It was so because the water surface could not reflect the sunlight.</td>
</tr>
</tbody>
</table>

Question 5: Why the sunlight blinked on the sea surface during sunrise?

<table>
<thead>
<tr>
<th>Answer Choice 1: (74%)</th>
<th>The sunlight scattered on the sea surface. Due to the differences in reflection angles, the sun’s image perceived by human eyes was different and looked blinking.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answer Choice 2: (5%)</td>
<td>Strong sunlight made human eyes winked, and it looked blinking.</td>
</tr>
<tr>
<td>Answer Choice 3: (0%)</td>
<td>The components of air and components of water interacted to come up with a chemical reaction to make sunlight blinking.</td>
</tr>
<tr>
<td>Answer Choice 4: (21%)</td>
<td>Sunlight illuminated on the sea surface and refracted, its image entered into human eyes and looked blinking.</td>
</tr>
</tbody>
</table>

Notes: 1. * was added in front of the correct answer; 2. Inside the parenthesis is the percentage of the sample that chose that answer.
Using a Developed Instrument to Evaluate University Students’ Perceptions of Six Teachers’ Pedagogical Content Knowledge

Syh-Jong Jang
Chung-Yuan Christian University, Chung-Li, Taiwan

This research aimed to evaluate university students’ perceptions of six teachers’ PCK (pedagogical content knowledge) development, using a developed instrument and workshop intervention, in order to help the university teachers understand their teaching better. The survey was conducted twice in this study, with the pre-test carried out during the mid-term examination and the post-test, in the last week of the semester. PCK workshops were also held for six university participated teachers to facilitate the reflection and exchange of ideas among teachers. This study adopted a case study approach and conducted both quantitative and qualitative analyses. The results show that except for teachers B and C, who show no significant difference in scores between the two surveys and slightly lower average points, the average points of the other four teachers improve significantly. In particular, this study clearly describes every teacher’s teaching performance before and after the reflection. The research limitations and difficulties encountered are also discussed in this study.

Keywords: PCK (pedagogical content knowledge), higher education, professional development, workshop intervention, college teaching and learning

Introduction

The professional growth of teachers is one of the major items promoted by the “University Teaching Excellence Program” of the Ministry of Education in Taiwan at present. Most university instructors entering the profession may find their initial teaching efforts stressful, but with experience they acquire a repertoire of teaching strategies and representations that they draw on throughout their teaching. When an instructor’s style of teaching provides a means of coping with many of the routine demands of teaching, there is also a danger that it can hinder his/her professional growth. PCK (pedagogical content knowledge) is an important indicator for assessing the professional skills of university teachers (JANG, 2009a). In fact, PCK has been described in many educational reform documents as a knowledge base necessary for effective teaching (AAAS (American Association for the Advancement of Science), 1993; NRC (National Research Council), 1996).

Shulman (1987) regarded PCK as the knowledge base for teaching. This knowledge base comprises seven categories, three of which are content related (subject-matter knowledge, PCK and curriculum knowledge). The other four categories refer to general pedagogy, learners and their characteristics, educational contexts and educational purposes. PCK combined subject-matter content and pedagogy, suggesting that this amalgam represented the understanding necessary for transforming subject matter into forms or viable instructions that are more accessible to students (Abell, 2008). It can be used effectively and flexibly in the communication.
process between teachers and learners during classroom practice. The crucial factor in this development of PCK is teaching reflection and experience (De Jong, Van Driel, & Verloop, 2005; Loughran, Mulhall, & Berry, 2004; TUAN, CHANG, WANG, & Treagust, 2000). The central goal of reflection was to develop teachers’ understanding of why they employ certain instructional strategies and how they can improve their teaching to have a positive effect on students (Lee, 2005). A reflection process could be a development activity as well as a means of enhancing PCK of instructors. Reflective practice is becoming the favored paradigm for continuing professional development in higher education (Clegg, TAN, & Saeidi, 2002).

In general, a survey to test the teaching effectiveness of university teachers is usually conducted at the end of each semester with the aim to find out the teaching performances of teachers for the previous period of time, and for them to make appropriate modifications accordingly. However, as most of the subjects in the current university curriculum are only taught for one semester, teachers do not have time to make modifications if students’ feedbacks are only made available at the end of the semester. In this way, they can only improve their teaching in the next semester. On the other hand, subjects taught in the next semester are usually new ones with new contents. Hence, improvement in teaching the same subject has to be postponed again. When improvement in teaching has been postponed for a lengthy period of time, it may result in poor teaching effectiveness. To overcome the limitations on curriculum design and to provide teachers with opportunities to make timely modifications, the questionnaire should be surveyed in the middle of the semester. Such method can not only satisfy formative evaluation requirements, but also have the effects of diagnostic evaluation with the aim to help university teachers in improving their teaching effectiveness.

Greater emphasis has been put on the research and development of elementary and secondary teachers’ PCK (Dalgarno & Colgan, 2007; De Jong et al., 2005; JANG, 2009b; Loughran et al., 2004; Van Driel, Verloop, & De Vos, 1998). However, previous research on learning environments has seldom addressed university teachers’ PCK. This research aimed to evaluate university students’ perceptions of teachers’ PCK development. This study employed the “questionnaire on university students’ perception of teachers’ PCK” developed by JANG, GUAN, and Hsieh (2009) as the research tool. In order to improve teaching and promote reflection, the questionnaire was employed at both mid-term and final examinations. PCK seminars were also held for university teachers to facilitate the reflection and exchange of ideas among teachers.

Theoretical Framework

It has also been reported that the success of college teaching depends not only on the teachers’ subject-matter knowledge, but also on their personal understanding of students’ prior knowledge and learning difficulty (Grossman, 1990; Lederman, Gess-Newsome, & Latz, 1994). In addition, other factors of success included their own teaching methods and strategies (Fernandez-Balboa & Stiehl, 1995; Hashweh, 2005; Lenze & Dinham, 1994). The pedagogical knowledge about certain topics and teaching strategies, including the knowledge of representation (as model and metaphor) and activities (as experiment and explanation) was closely related, and demanded a flexible schema for implementation (De Jong et al., 2005; Grossman, 1990; Lederman et al., 1994; Van Dijk & Kattmann, 2007). More importantly, when dealing with pedagogical knowledge, teachers’ actions will be determined to a large extent by their PCK, making PCK an essential component of professional knowledge. Some studies also showed that a science teacher well equipped with the subject-matter knowledge might be able to transfer his/her knowledge in a more efficient way, enabling the students to receive the knowledge more easily (Carter & Doyle, 1987; Tobin & Garnett, 1988). When teaching unfamiliar topics,
science teachers expressed more misconceptions (Hashweh, 1987) and they talked longer and more often, and posed questions of low cognitive level (Carlsen, 1993). These results were interpreted in terms of PCK rather than subject-matter knowledge (Sanders, Borko, & Lockard, 1993).

Magnusson, Krajcik, and Borko (1999) stressed that the development of PCK is determined by the content to be taught, the context in which the content is taught, and the way the teacher reflects on his/her teaching experiences. Although teaching experience was taken as the primary source of PCK development, reflection was also a critical component of professional development. Reflection, therefore, emerged as another important element for novice teachers in developing expertise in their practice, and was central to their accepting more responsibility for their actions (Loughran, 2002; Shulman, 1987; Wallace & Oliver, 2003). Nilsson (2008) emphasized the role of teaching experience and reflection as a way of better understanding the complex entities that constituted a knowledge base for teaching. She drew attention to the value of teachers participating in experiences that might contribute to the development of their PCK and supported the view of PCK development as a process of transformation. Mezirow (1990) stated that reflection was an examination of the justification for one’s beliefs primarily to guide action and to reassess the efficacy of the strategies and procedures used in the classroom. Reflective practice involves the process of teaching and the thinking behind it, rather than simply evaluating the teaching itself.

Major and Palmer (2006) used a qualitative study of faculty members participating in a university campus-wide problem-based learning initiative to examine the process of transforming faculty PCK. They found that the existing knowledge of faculty and institutional intervention influenced new knowledge of faculties’ roles, students’ roles, disciplinary structures and pedagogy. Teachers’ PCK was deeply personal, highly contextualized and influenced by teaching interaction and experience (Van Driel, Beijaard, & Verloop, 2001; De Jong et al., 2005; Van Dijk & Kattmann, 2007). Mulholland and Wallace (2005) suggested that teachers’ PCK required the longitudinal development of experience as they developed from novices to experienced teachers. Hammersley-Fletcher and Orsmond (2005) used peer observation of teaching as the process employed within higher education establishments that can be instrumental in developing the reflective practices of professional lecturers. Reflection leads to self-knowledge, and this is important to the professional development of instructors in higher education institutions.

To keep reflecting in teaching, in particular, the reflective teaching from the perspective of the practice epistemology poses a great challenge to the traditional education model. It requires that the acquisition of practical teaching experience and reflection should be a main path for the professional growth of teachers. Penny and Coe (2004) pointed out that it has become a common feature in universities across the world to employ student feedbacks as an indicator of teaching quality. Although students’ perceptions might not be consistent with the reality generated by outside observers, they could present the range of reality for individual students and their peer in the classroom (Knight & Waxman, 1991). Students’ comments and perspectives can allow teachers and researchers to bring changes to the teaching, the teaching environment and the students’ learning experience as well as provide university teachers with appropriate support to enhance their teaching effectiveness.

The main advantage of applying the questionnaire in university students’ perception of teachers’ PCK was that teachers tended to be trapped in the self-righteous thinking as they were embodiments of authority in classroom (JANG et al., 2009). To observe the teaching scenario more objectively, it is necessary to discuss from the students’ viewpoints to better understand the PCK development of teachers. In particular, as the students are involved in the teaching process, if teachers have achieved the expected pedagogical objectives, they can be
better understood through students’ perception. Moreover, it was judged by all students instead of a small number of observers (De Jong et al., 2005; Major & Palmer, 2006; Van Driel, De Jong, & Verloop, 2002).

Research Method

This study adopted a case study approach and conducted both quantitative and qualitative analyses. The quantitative data were collected via a survey administered to six classes in a university. As for qualitative data, the researchers analyzed the students’ feedbacks on the open-ended questions, teachers’ reflection through workshops and individual interview of teachers. The data were analyzed with SPSS (Statistical Package for Social Science), as well as discussion and elaboration on related qualitative data. This study was designed on the basis of reflective teaching, which means that reflection on teaching is an important means for teachers to explore and deliberate on their classroom teaching experience to constantly improve their professional skills and teaching quality. Through steps, such as questionnaire, reflection and teaching consultation, university teachers can continuously deepen their rational understanding about the teaching practice, perfect teaching procedures and improve teaching standards.

Research Sample

The subjects were students from six classes of the College of HE (Human & Education), the College of EECS (Electrical Engineering & Computer Science) and the College of E (Engineering) of a university enrolled in the first semester of 2008, and six new teachers (denoted by A-F respectively) (see Table 1). Table 1 shows the number of students taking the course, and the number of valid samples collected before and after the survey.

Table 1

<table>
<thead>
<tr>
<th>College</th>
<th>Teacher</th>
<th>Subject</th>
<th>Total</th>
<th>Valid samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>HE</td>
<td>A</td>
<td>Chinese</td>
<td>62</td>
<td>47</td>
</tr>
<tr>
<td>HE</td>
<td>B</td>
<td>Introduction to Chinese culture</td>
<td>64</td>
<td>48</td>
</tr>
<tr>
<td>HE</td>
<td>C</td>
<td>Information systems &amp; Internet foundations</td>
<td>62</td>
<td>28</td>
</tr>
<tr>
<td>EECS</td>
<td>D</td>
<td>Introduction to computer science</td>
<td>65</td>
<td>46</td>
</tr>
<tr>
<td>EECS</td>
<td>E</td>
<td>Probability &amp; statistics</td>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td>E</td>
<td>F</td>
<td>Engineering mathematics</td>
<td>71</td>
<td>41</td>
</tr>
</tbody>
</table>

Research Procedure

This study lasted for about five months, from the beginning of September 2008 to the middle of January 2009. The research process of university teaching (see Figure 1) was designed by the researcher and comprised the following steps: (1) Initial instruction; (2) Teaching recording and observation; (3) Mid-term assessment; (4) Final assessment; (5) Interviewing; and (6) Teaching reflection, which proceeded continuously during the above stages.

As seen in Figure 1, teaching reflection (step 6) is the main focus of this model and should continue throughout steps 2-5. Step 1 is the initial instruction. Through the first workshop, the researcher illustrates and discusses with the teachers participating in this study. In addition, the researcher introduces the related theories of PCK and the research tools in this study. In step 2, the researcher discusses the time and date of the teaching recording with the case teacher in advance. Then the assistants go and record the class. The video recording can help the case teacher observe and reflect on his/her own teaching. Step 3 is the mid-term assessment. The
researcher uses the questionnaires to survey students’ perceptions of the teachers’ PCK, and then analyze the results obtained. During steps 3-4, the second workshop is organized in order to analyze students’ perceptions through the results of pre-test for teachers’ PCK. Teachers with excellent teaching performance are invited to provide consultation for novice teachers who lack experience. Through interaction and discussion, teachers can reflect continuously on the changes in various dimensions of PCK. Step 4 is the final assessment. The researcher applies the questionnaires again as the post-test to investigate the differences of the teachers’ PCK after the teaching reflection. During steps 4-5, the third workshop is held to illustrate the comparison results of the pre-test and post-test questionnaires and discuss students’ perceptions of teachers’ PCK. In step 5, the researcher interviews the case teacher and discusses the results from video recordings as well as pre- and post-tests questionnaire analyses. Finally, the researcher asks the case teachers’ teaching reflection (step 6), and then brainstorms together for suggestions for better teaching.

![Figure 1. The process of university teaching.](image)

**Data Collection and Tools**

**Questionnaire**

This study used the “questionnaire on university students’ perception of teachers’ PCK” designed and developed by JANG et al. (2009) as the tool. The contents include four dimensions, which are SMK (subject matter knowledge), IRS (instructional representation & strategies), IOC (instructional objects & context) and KSU (knowledge of students’ understanding). There are seven sub-topics for each dimension; thus, there are a total of 28 items. The pilot study analyzed the questionnaire results of 182 college students with a total of 172 valid samples collected. With regard to validity and reliability, the questionnaire presented very high validity and reliability. The reliability analysis was conducted by internal consistency reliability. The analysis results showed that the Cronbach’s \( \alpha \) value is 0.965, indicating that the internal consistency of the 28 items is good. Regarding the validity analysis, it was conducted by expert review on PCK-related fields, and factor analysis for verification and modification. In this study, the first and second surveys were conducted during the middle and at the end of the semester respectively, to further understand the changes in students’ perception of teachers’ PCK.
PCK Workshops

PCK workshops are mainly to gather new university teachers from various colleges and educational research experts for discussion and exchange of views to enhance teaching improvements for better effects through peer group stimulation and exchange of views. Teachers with excellent teaching performance and educational experts are invited during the seminar period to provide teaching consultation for reference by new teachers who lack teaching experience or rookie teachers. Through interaction and discussion among teachers, they can continuously reflect on the changes in various dimensions of PCK. Thus, teaching deviations can be modified timely to learn about students’ needs on learning courses quickly and effectively.

Individual Interview of Teachers

Individual interview of teachers is mainly presented by teaching diagnosis reports and observation results of the classes. The first-hand feedback information of students is given to teachers to understand the compliance of students’ perception with the teaching, and conduct reflective teaching immediately. The teaching diagnosis report is produced according to the evaluation of researchers on the teaching effects and the analysis of integrated results of “questionnaire on university students’ perception of teachers’ PCK”. The results of the first survey are given to teachers after the mid-term, and the teachers would have “reflections” after reading the report in the middle of the semester to enter the “change” and “action” stage, in order to improve teaching effectiveness. The results of the second survey are given to teachers after the final examination to have a general view of the changes in PCK as perceived by students.

Data Analysis

Data were collected, summarized and coded by survey, interview and PCK workshops. The quantitative data include the results of two surveys. The survey data are measured by Likert five-point scale, and rated from 1 to 5 points according to the degree of difference. Finally, comparative analysis of the two surveys is conducted by t-test. The qualitative data include the feedbacks of teachers, as well as the continuous comparative discussion on other qualitative data. The qualitative analysis is carried out according to Patton (1990): (1) gather all the original data; (2) organize, categorize and edit the original data into files that can be easily identified and acquired; and (3) summarize and identify important indexes for in-depth analysis according to study problems and types. In other words, data analysis was to continuously interpret and explain these data (Erickson, 1986). Triangulation method is employed to interpret the histories and changes in PCK professional growth of the individual teachers. Then, the data are categorized and coded according to different interview contents to establish specific data login categories.

Research Results and Discussion

Table 2 shows the changes in average means (M) and standard deviations (SD) of six new university teachers with their student numbers (N) in the two surveys. Except for teachers B and C, who show no significant difference between the two surveys and slightly lower average points, the average points of the other four teachers improve significantly. However, teacher B’s average points in the two surveys are the highest (M > 4.40), while those of teacher C are relatively low. To further explore the reasons for the change in PCK of the six new teachers and make teaching diagnosis as well as recommendations, the following section will discuss and compare the performances of the teachers. Moreover, pedagogical problems of the teachers can be identified to make modifications through related qualitative auxiliary materials (including students’ feedbacks,
USING A DEVELOPED INSTRUMENT TO EVALUATE

Table 2

<table>
<thead>
<tr>
<th>Teacher</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>47</td>
<td>3.89</td>
<td>1.01</td>
<td>-3.458**</td>
</tr>
<tr>
<td>Pre-test</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-test</td>
<td>47</td>
<td>4.25</td>
<td>0.40</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>48</td>
<td>4.55</td>
<td>0.36</td>
<td>1.580</td>
</tr>
<tr>
<td>Pre-test</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-test</td>
<td>48</td>
<td>4.48</td>
<td>0.37</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>28</td>
<td>3.75</td>
<td>0.25</td>
<td>0.292</td>
</tr>
<tr>
<td>Pre-test</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-test</td>
<td>28</td>
<td>3.72</td>
<td>0.76</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>46</td>
<td>3.87</td>
<td>0.51</td>
<td>-14.662***</td>
</tr>
<tr>
<td>Pre-test</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-test</td>
<td>46</td>
<td>4.23</td>
<td>0.53</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>50</td>
<td>3.87</td>
<td>0.54</td>
<td>-5.782***</td>
</tr>
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<td>Pre-test</td>
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<td>3.23</td>
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<td>Post-test</td>
<td>41</td>
<td>3.56</td>
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Notes: **p < 0.01; ***p < 0.001.

Teacher A’s Assignment Is Heavy and Examination Content Is Too Difficult; She Discovers the Teaching Blind Spots Through Reflection

For teacher A of the “Chinese” course, some students provided the following feedbacks to the open-ended questions such as:

Student 04: I have learned almost nothing, there are too many reports, and it is hard to understand the teacher’s intention.

Student 08: There are too many unnecessary tests. I don’t know what is the point of all those!

Student 12: The tests are too difficult, and it is impossible to assess the learning effects of students. (Class A—first questionnaire)

From the students’ feedbacks in the first survey, it can be seen that students generally think that the reports and evaluation methods of teacher A cannot test their understanding of the subject contents. In addition, some students also said that the examinations and subject contents are rather difficult. Students’ feedbacks and suggestions related to examination or content difficulty have been dramatically reduced in the second survey as the average points in all four dimensions have reached over 4.0. Moreover, teacher A reflects constantly and discusses with other teachers when participating in the seminars, for example:

Teacher A: My biggest gain from the mid-term questionnaire is the open feedbacks of students, amounting to as many as 30. Most students do not understand clearly from the very beginning why they have to take the Chinese course. Hence, their attitudes toward the classes are very polarized as some students sitting at the back of classroom do not want to listen
at all as they believe it is unnecessary.

Teacher B: You can communicate with students in the first class. I did not explain the textbook in great detail. Instead, I communicated first with them explaining why we should take the Chinese class in our freshman year.

Teacher A: Maybe I myself am not too familiar with the Chinese subject, and my specialty is history of literature.

(Workshop)

Taking advantage of the seminars to exchange views with other teachers, teacher A found that the teaching blind spot was actually the failure to notice the individual differences between students who were polarized in learning attitudes. Hence, it is important to design appropriate teaching contents and methods that aimed at students who are not motivated in learning. Moreover, the way of conducting Chinese classes should be different from that on history of literature, so as to help students understand the meaning and significance of learning Chinese.

**Teacher B’s Teaching Is Animated and Vivid Realizing From the Reflection That Theme-Based Teaching Is Most Suitable**

Teacher B teaches “Introduction to Chinese culture”. Some of the students’ feedbacks and suggestions given in the open-ended questions are as follows:

Student 01: The teacher is very serious; I like his class very much; the class contents are vivid and interesting.

Student 30: The teacher is serious in teaching and the materials he prepares are informative.

Student 25: The teacher demonstrates his teaching contents using many graphics and PPT (PowerPoint). (Class B—second survey)

Although there is no significant difference between the results of the two surveys for teacher B, his average points are the highest among the six teachers ($M > 4.40$). In fact, teacher B has been teaching related subjects for years in other universities, and was awarded with the Certificate of Excellent Teacher by the Ministry of Education. Despite his rich teaching experience, teacher B is teaching in this university for the first year, and he voluntarily participates in the seminars to improve his professional skills. The interviews show that, teacher B conduct his class in a lively and vigorous manner, and is able to use many graphics and PPT presentations for illustration.

Teacher B: In fact, this subject is very interesting. I conduct every class in a theme-based manner and ask students to do some homework of field investigation. For example, when teaching the topic of food vendors in Taiwan, I asked students to try out various Taiwanese foods, and take photos as evidence to write a report on this topic. When teaching the topic of china or artifacts, I asked them to go to the National Palace Museum, or at least view the objects on the Internet.

(Interview)

**Teacher C Teaches Too Fast, So That Students Cannot Fully Understand the Contents Taught Realizing From the Reflection that He Is Not Aware of the Students’ Prior Knowledge**

Teacher C teaches “Information systems & Internet foundations”. Some of students’ feedbacks and suggestions provided in the open-ended questions are as follows:

Student 07: Sometimes, the teacher teaches too fast and even jumps to the next section even before we fully understand the content.

Student 14: The implementation process is not sufficient due to time limit; it will be perfect if we are not in such a hurry!

Student 15: Some contents are relatively difficult; we hope the teacher can teach it twice! (Class C—first survey)

Students generally think that teacher C teaches too fast. Hence, the teacher should explain, illustrate and
practice more about the units or parts that the students do not understand. During the seminars, teacher C has reviewed this problem and pointed out that “the majority of novice teachers tend to cause learning disruptions to students when teaching at inappropriate pace; hence, more attention should be paid in the future” (workshops). Therefore, the teacher should understand prior knowledge and learning difficulties of students more precisely as the basis for teaching design and evaluation. Regarding that the contents are relatively difficult, more illustrations or analogies should be given, or students should be encouraged to express their opinions, in order to create positive interaction between the teacher and students.

**Teacher D’s Course Content Is Difficult and the Class Is Outnumbered Realizing From the Reflection That Appropriate IRS Should Be Adopted**

Teacher D teaches “Introduction to computer science”. Some of students’ feedbacks and suggestions provided in the open-ended questions are as follows:

- Student 01: Programming language is so hard!
- Student 14: The class size is too large, resulting in an adverse learning environment; I wonder if we could move to a bigger classroom to guarantee that each person has access to one computer. (Class D—first survey)

As it can be seen, teacher D should strengthen the explanation of the contents taught, especially about programming language. As to contents that are difficult for some students, they should be encouraged to raise questions at anytime. In addition, whether the learning environment is appropriate should be noted to provide students with more practicing opportunities.

- Student 35: When we ask questions, the teacher would explain the abstract knowledge with examples, helping us to understand.
- Student 08: The teacher uses diversified teaching methods, and I have started to like this subject. (Class D—second survey)

Computer programming language is rather difficult for students, as it is indicated in the first survey; however, the second survey reveals that the teacher is able to illustrate abstract knowledge with examples and use diversified teaching strategies to help students understand the concept of the subject better.

**Teacher E’s Teaching Assessment and Arrangements Need to Be Improved; He Adopts More Illustration and Elaboration After Reflection**

Teacher E teaches “Probability and statistics”. Some of students’ feedbacks and suggestions provided in the open-ended questions are as follows:

- Student 08: The class is easy, but the examinations are rather hard with tricky questions.
- Student 05: The teaching is too slow at the beginning, thus, it becomes very fast later; and I cannot keep up with the progress.
- Student 18: The progress is too slow sometimes, and I get bored easily. (Class E—second survey)

Researchers: It is suggested that teacher E should make more illustration and explanation on relatively difficult units or parts, and spend more time on those parts. Moreover, when designing the examinations, teacher E has not clearly informed the students on the percentage of questions related to various topics in order for students to know how to prepare for examinations. (Workshop)

Students in this class expressed that the examinations were relatively hard and they did not know how to prepare for them. They expected that the teacher could lower the difficulty of the examinations. The teaching pace is relatively quick, and some students may have learning difficulties. Regarding arrangements for teaching content, teacher E may modify the teaching progress according to the level of difficulty of the content (e.g.,
number of theme-based classes), so that students can understand each theme better. In addition, the teacher can encourage students to do more practice and calculation, and arrange quizzes or practices, in order for students to understand the problems and for the teacher to be aware of the students’ learning difficulties.

**Teacher F Uses Inappropriate Teaching Strategies; Adjusting the Teaching Strategies Through Reflection**

Teacher F teaches “Engineering mathematics”. Some of students’ feedbacks and suggestions provided in the open-ended questions are as follows:

Student 08: In terms of effectiveness in teaching this course, using PPT is worse than using blackboard.

Student 22: It is hard to understand engineering mathematics illustrated by PPT.

Student 28: It is better to write on the blackboard when teaching engineering mathematics. (Class F—first survey)

As it can be seen, students generally complained that teacher F’s teaching strategy in using PPT for explanation and elaboration on calculation was inappropriate and led to learning difficulties. Thus, teacher F’s average points in the second survey are lower than those of other teachers. Moreover, teacher F claims that the students in that class are with different levels, and most of them are retaking the course; thus, it is hard to teach them according to their levels. Teacher F keeps reflecting to search for proper solutions to the problems during the seminar courses.

Teacher F: Since many students are from the Department of Continuing Education or evening schools, and are taking the course for the second or even the third time, I am perplexed by their different levels! I really do not know how to teach the course. I think writing on the blackboard is too slow, and it is really more convenient to use computer in teaching! Turning pages and citing from here and there would be more convenient, really convenient! (Interview)

In fact, PPT cannot be fully applied in the engineering course. Some calculation deduction process would be much clearer when written on the blackboard. Hence, after taking the seminars and listening to the researcher’s suggestions, teacher F starts to reflect on improving the teaching method, and using both PPT and blackboard to cater for the students’ thinking and learning model.

Researcher: One disadvantages of PPT is that it presents all the answers and the procedures for reaching the answers. Therefore, thinking and interactivity would be weakened as the answers are already known! In fact, there is no fixed rule on using PPT or blackboard, they can be used together, and you may use PPT to present graphs or summaries. (Workshop)

**Conclusions and Implications**

The main contribution of this study is to use the survey to understand the overall teaching performances of the teachers and provide them with teaching reflection. Compared with traditional semester-end evaluation, which could only collect rather few opinions, this design could also collect students’ many opinions from open-ended questions and provide diagnostic function to allow new teachers to find out their changes or differences after a period of teaching, and make reflective thinking as well as timely modifications. From the students’ comments, it is found that four dimensions of the questionnaire (SMK, IRS, IOC and KSU) should be taken into consideration regarding practical teaching. The performances and changes of the teachers can be learnt from such dimensions. However, in fact, it symbolizes the overall change of teachers in terms of PCK for the paper length’s shake.

With regard to PCK of the teachers in this research, teachers A and D showed good progress and growth of PCK during the research period. In spite of the slightly lower points, teacher B maintained a certain level of performance. Teachers C, E and F needed further improvements and modifications in all four dimensions. In
the first survey, some students complained that teacher A gave too much homework and the examinations were rather difficult. After reflection, she has realized her teaching blind spots and noticed the individual differences among the students. Students suggested that teacher B’s teaching was lively and vivid. Teacher B finds that he is good at theme-based teaching, which allows students to explore the fun of life. Students complained that teacher C taught too fast, and they could not fully understand the contents taught. After reflection, teacher C finds that he does not understand the prior knowledge and learning difficulties of the students. Students expressed that teacher D’s course was relatively hard and the class size was too big. After reflection, teacher D decides to adopt diversified teaching strategies and features to overcome the teaching difficulties. Students expressed that teacher E’s examinations were rather hard and the teaching pace was not consistent. After reflection, it is recommended to adopt more illustration and explanation to allow students to understand the teaching method better. Finally, students complained that teacher F’s teaching strategies are not appropriately used. Reflection enables him to consider what the most effective teaching strategies are.

There are very few researches on the development of university teachers’ PCK. Major and Palmer (2006) conducted a qualitative study on PCK using problem-based learning activities of the university teachers, and recommended that universities should hold study programs to help teachers evaluate the changes in PCK. In view of this, six new teachers participated in the survey, and exchanged views with other teachers and the researcher in the PCK seminars to find out the solutions. Moreover, reflective teachers are involved in comparing the quality of their teaching (Hammersley-Fletcher & Orsmond, 2005). The feature of this study is to analyze using both quantitative and qualitative methods to make modifications in teaching. In the final seminar study and discussion, the researcher made an analysis on the questionnaire results, and gave suggestions to the six teachers.

The six new teachers reflected on their teaching during the PCK seminars, and gradually constructed individual knowledge and individual teaching method (Magnusson et al., 1999). Future studies can focus on how to convert subject skills and discussion about methods, and integrate more qualitative data for analysis and illustration. The following research limitations and difficulties are encountered in the process of this study. They are: (1) It is not easy to arrange the seminars since teachers have different teaching schedules, and not all the teachers can participate in the entire research process; (2) Students’ class attendance varies, thus, the number of samples in the two surveys cannot be accurately controlled, resulting in fewer valid samples; and (3) The time of questionnaire survey is determined by teachers, but the students’ willingness to fill out the questionnaire is significantly lower before examinations.

If the above limitations can be overcome, the implementation of survey and participation in seminar may be more effective. Hence, future studies can use online questionnaire method to track more accurately the number of respondents and students’ feedbacks for more in-depth analysis.

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Using Mobile Device for Learning: From Students’ Perspective

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This study aims to examine students’ acceptance of mobile technology usage for learning. A questionnaire designed with five open-ended questions was distributed to 20 students from the Faculty of Industrial Art and Design Technology of Unisel (Universiti Industri Selangor), Malaysia. Results construes that students were not keen on m-learning (mobile learning), as they did not rely greatly on the mobile phone in assessing their learning materials such as lectures and lab sessions. They were more familiar with studio-based and face-to-face learning approach instead of m-learning and were not receptive to this new idea of learning using mobile technology, even though they always used the mobile device features. The limitations in the mobile device feature, costs and its usability become the prominent factors that hinder the students from fully accomplishing their m-learning exercises. They were willing to explore the idea of using mobile technology for learning, especially in a studio-based setting. They did not see any improvement of knowledge from the perspective of the learning process know-how to the show-how on mobile technology usage for learning. They could not relate to any learning connection between mobile technology and studio-based learning, even though in the first part of the case study, the results have shown positive attitude and acceptance on the study made on a sample lesson of form, space and gestalt theory in the graphic design subject. Students also obtained analogous experiences on small size keypads, screen resolutions, and navigation which could be the major problematic factors to them and thus, affected their m-learning process as it was unfriendly to use and the device was prone to damage. They have yet to accept that the concept of mobility in learning is applicable to the learning process, apart from utilising a mobile device for casual usage. However, this limitation does not restrict the students from exploring this new learning environment in the future, since they were willing to increase their learning exposure using mobile device.

Keywords: mobile, mobile device, learning, knowledge, informal learning, Malaysia

Introduction

Quinn (2000) defined m-learning (mobile learning) as the “intersection of mobile computing and e-learning (electronic learning): “accessible resources wherever you are, strong search capabilities, rich interaction, powerful support for effective learning, and performance-based assessment. E-learning is independent of location in time or space” (p. 8). Meanwhile, Sharples, Taylor, and Vavoula (2007) defined it as the process conversations across multiple contexts amongst people and personal interactive technologies. Wood (2003) indicated that m-learning is location-based, situation-dependent and based on interaction between mobile devices and learners. A wide definition of m-learning is the ability to learn independently of place and
time, facilitated by a range of mobile devices (as cited in Learndirect & Kineo, 2007). They enlisted the M-learning series of characteristics that potential buyers and designers should be aware of.

There was a general opinion that schools, colleges and universities would absorb and digest personal mobile technologies, just as they had all previous technologies, without profound change (Sharples et al., 2007). However, it was noted that many pockets of tension were likely to take place between social and educational technology use, and that integration would need to take a variety of forms (Sharples et al., 2007). According to Sharples et al. (2007), children in general did not want school to intrude in their personal life. There was a danger that the enthusiasm of schools, and some parents to extend school by, for example, parent access to school intranets, bite-sized teaching and revision via SMS (short message system), and new technologies such as location-based tracking, might be seen by children as schools attempting to colonize and control their social world (Sharples et al., 2007).

According to Sharples et al. (2007),

There is a need to discuss where the bounds of the school lie and where it is not legitimate for formal education to intrude on childhood. There is an urgent need for teachers, parents and policy makers to understand the new technologies and the new forms of online interaction. They need to debate with young people the issues not only of how these can be harnessed for the purposes of formal education, but whether they should be, and if so, how.

This paper therefore aims to examine the students’ acceptance of mobile technology usage for learning. The study was conducted at the design studio in the Faculty of Industrial Art and Design Technology of Unisel, Malaysia, via face-to-face mode with the students.

**Literature Review**

The mobile phone is a necessary device for living. In early 2009, there were around four billion mobile subscribers worldwide. GSM (Global System for Mobile Communications) is still the most popular mobile technology (MarketResearch.com, 2009). Mobile phones are varied in size, design and model. The varied designs are meant to cater for varied customer tastes. There exist assumptions that the users of mobile technology consisted of youngsters but the usage is equal across all users. Studies showed that the range of learners whose needs might be met by m-learning includes mature aged, gifted, and remote learners, as well as those with cognitive, behavioral or social problems, or with physical or mental difficulties (Rodríguez, Nussbaum, Zurita, Rosas, & Lagos, 2001; Savill-Smith & Kent, 2003; P. Strom & R. Strom, 2002). Cobcroft, Towers, Smith, and Bruns (2006) argued that constant exposure to digital technologies, gadgets, games and mobile devices had evolved a new breed of learners, the digital natives: those learners who think and process information fundamentally differently from their predecessors, and the digital immigrants, whose interaction with these digital tools is not innate.

Zurita and Nussbaum’s (2007) survey of student opinions regarding college teaching and learning basic mathematical skills on handheld computers were interconnected by a wireless network. The result shows that the students had minor technological problems but by the end of the pilot study they were experts. The students realized that mutual support was fundamental in achieving their goal. The study shows positive effects on the student social interaction, motivation and learning.

In Motiwalla’s (2007) study, the students found the m-learning useful and a good complimentary tool for the classroom interaction. They rated neutral on ease-of-use, but found the interaction tools easy for discussing course materials with other students and instructors. They found the mobile phone keypads and screens very
difficult while navigating, reading and typing their messages. However, once they overcome this user-interface hurdle the m-learning applications used for classroom interaction were easier to understand. The students foresee m-learning as an effective learning tool or aid, providing flexible access from anywhere and convenient to use application. Students also perceive an important supplementary role for wireless/handheld devices in e-learning and are effective in delivering personalized content. Unlike desktop e-learning, m-learning has the benefits of mobility and its supporting platform, which can be summarized as being usability, technology usage, connectivity and accessibility.

Usability is more elusive. Software tools need to be usable without incremental effort. What is the point of automation if it takes more work to do the job with the software than without it? In the often hands-free and eyes-free environments where m-learning is most appropriate for just-in-time learning support, complicated key controls and difficult-to-read screen presentations will only be tolerated under certain very limited conditions. The rest of consumers are not willing to risk having a bad experience. For broad and long-term adoption, the experience really did matter (Wagner, 2005). A usable device is satisfying, easy to use and improves learning effectiveness and efficiency. An accessible device meets the needs of users with specific learning difficulties or disabilities, such as visual, hearing, speech, mobility or manual dexterity impairment. Usable and accessible devices are keys to creating an inclusive m-learning environment.

M-learning could complement other teaching and learning methods or replace them, and could be modeled in the same way as other methods (Traxler & Kukulska-Hulme, 2005). It can also enhance non-academic and para-academic support, such as pastoral care, feedback and remediation, motivation and guidance, supporting students across the institution, course administration and management, and institutional quality assurance.

Wireless networking connectivity is increasingly built into current handhelds, and can be added to older models with a wireless adapter card. The oldest of these technologies is infrared, now being widely replaced by Bluetooth. Although it only connects with adjacent devices, such as other handhelds or printers, Bluetooth transfers data faster than infrared. Bluetooth enables handhelds to access the Internet by connecting to Bluetooth-enabled mobile phones, which contact an ISP (Internet service provider). Smart phones connected directly to an ISP without additional equipment or adapters (Traxler & Kukulska-Hulme, 2005). As more people gain greater comfort with simple mobile applications like SMS text-messaging and mobile Web-surfing, the greater will be the demand for broadband service. As bandwidth increases and media players like Flash continues to improve users’ experiences, mobile applications will continue to increase rapidly.

Handheld digital devices were becoming more common, and their quality and capability were increasing due to technological breakthrough in miniaturization and advancements in wireless bandwidth and data networks (Keegan, 2002). Important characteristics for m-learning devices and tools should be that they are highly portable, can be individually adapted to the abilities, knowledge and learning styles of the user, unobtrusive, available anywhere and adaptable, persistent, useful and intuitive for people who have no prior experience with technology. Beyond that, we knew that portability could foster a greater feeling of ownership over learners’ work (Passey, 1999).

Indeed, a mobile computer-supported cooperative learning environment greatly enhanced mobility, coordination, communication, organization of materials, negotiation and interactivity over traditional cooperative learning environment (Zurita & Nussbaum, 2007). Roschelle (2003) demonstrated five reasons for using wireless devices in cooperative learning: (1) Augmenting physical space; (2) Leveraging topological space; (3) Aggregating coherently across all students’ individual contributions; (4) Conducting classroom
performances; and (5) Students’ acts becoming artifact.

The literatures implied that applications designed for use on mobile phones must take cognizance of users’ preferences. In teaching and learning, the application should conceptualize the learner (Conole, 2004). It seemed that engaging students and making them active participants rather than passive listeners led to higher learning outcomes (Prosser & Trigwell, 1999; Ramsden, 1992). Interaction and active participation allowed students to share ideas and applied their knowledge, exposed them to perceptions of their peers, made learning more enjoyable, and allowed the lecturer to test understanding (Sixsmith, Dyson, & Nataatmadja, 2006; Slain, 2004).

Methodology

As many as 20 students, 10 males and 10 females, aged about 19-20 years old, from the Faculty of Industrial Art and Design Technology of Unisel, Malaysia, were selected as respondents for this exercise. The method of sampling used is the stratified random sampling method. Participants were chosen based on an extracted name list in accordance with the active involvement of the members in the assigned group, out of the total student list involved in the study. The students were familiar with the m-learning setting in the earlier case study conducted in a sample lesson of form, space and gestalt theory in the graphic design subject. They have to complete an open-ended questionnaire asking their opinion about their acceptance/adoption of mobile technology for learning. Questionnaires were distributed to them at the design studio.

An open-ended questionnaire comprising five questions was distributed to the participants. The first question revolves around the participants’ opinion on the usage of mobile technology for learning and their reliance on the mobile phones in assessing and delivering their learning material such as lectures and lab sessions. In the second question, the participants were asked whether the mobile device feature and content enhanced their knowledge from the perspective of the learning process from the know-how aspect to the show-how aspect. The third question ponders about the respondent’s opinion whether m-learning could enhance their knowledge on the subject that they find difficult to understand. In the fourth question, the participants were asked about the problems that they faced in the learning process, namely, the keypad, screen resolution, navigation etc., that restrict their learning and viewing experience while using the mobile devices. The last question probed on the participants’ opinions on the concept of mobility in learning, the application of this concept in the learning process and whether the mobile phone can replace the function of the university, to gain knowledge in the future.

Results

Students’ responses to the five questions on their acceptance of mobile technology usage for learning are presented in this section.

Learning Reliance on Technology

This first question requires the students to provide their opinions on the usage of mobile technology for learning and their reliance on the mobile phone in assessing and delivering their learning material. The derived results embrace four important aspects as discussed below.

Resistance of usage. More than 80% of the students did not rely greatly on the mobile phone in assessing their learning material such as lectures and lab sessions (see Figure 1). Most of the students (S1, S2, S4, S12, S13, S14 and S15) had some resistance on the usage of mobile technology for learning. S1 stated, “No, I do not like the idea. There’s no line coverage”. S2 stated, “I don’t rely greatly on mobile phone”. S4 indicated, “No, I do not
agree about the usage of mobile technology for learning. I do not have a phone and the phone line coverage at my place is very poor”. Meanwhile, S12, S13, S14 and S15 pointed out respectively, “No, I do not like to use mobile phone for learning”, “No, it is not suitable for learning”, “No. It is difficult to see the information” and “No, I don’t like to view my learning material on mobile phone”. Many of the students were reluctant to accept mobile technology usage for learning because they were unfamiliar with this new idea of learning. They used to learn using a studio-based approach, and thus they were not open to this new learning concept.

Reliance and dependency on face-to-face learning approach. Other analyses reveal that the students did not rely on mobile technology usage for learning. They were more confident to learn via face-to-face learning approach in a studio-based learning environment. S3 stated, “No, I prefer the face-to-face lecture”; S6 indicated, “No, the lecture material would not be the same and clear as the face-to-face lecture session”. Meanwhile, S7 highlighted, “I do not like to use mobile technology for learning, because I depend greatly on my lecturer’s tutorial. The explanation is more understandable and clearer than the mobile screen”. S10 seems to agree as he noted, “Mobile phone is not reliable for learning. I prefer the face-to-face teaching method”. Another student, S8, however mentioned, “I prefer to use e-learning system”.

Willingness to adopt the mobile technology for learning. Several students, S16, S18, S19 and S20 were willing to adopt mobile technology for learning. S16 indicated, “It could be useful to certain extent”. Meanwhile, S18 stated, “Yes, it is fine for simple learning content. However, it is not feasible to use the mobile phone in a complex learning condition such as tutorial and lab experiment session”. Then, S19 confirmed, “Yes, but it could only be an alternative tool to conventional face-to-face learning method”. S20 also pointed out, “Yes, but I do not like my lecturer to rely greatly on mobile phone for their learning deliverance”. In considering the studio-based approach, some of the students could accept the intervention of mobile technology into their studio-based learning. They felt that certain features of the devices such as the camera and the video could assist their understanding in learning by using graphics and motions.

Limitation of cost. The analysis also shows that students did not rely on mobile technology for learning due to the limitations of cost. This is evident from students’ (S5, S9, S11 and S17) opinions. S5 indicated, “I do not like to use mobile technology for learning because it is costly for a student to buy the mobile prepaid credits”. Meanwhile, S9 mentioned, “No, I could not afford to buy expensive high tech mobile phone”. This is followed by S11 who indicated that, “No, it is costly and my phone does not have the advance feature of a smart phone”. Lastly, S17 said, “I prefer the conventional teaching and e-learning method. Mobile phone is
costly for me”. Seemingly, students with limited amount of allowances relied greatly on the mobile phone for these reasons. On average, the cost of a mobile phone is RM (Malaysian Ringgit) 500 and below, which depends on the type of phone available in the market. They can afford to their own mobile phones with basic features but not interactivity and advance features of MMS (multimedia message system), camera, video, audio, GPRS (general packet radio services), Bluetooth and smart phone.

Improvement of Knowledge From the Perspective of Learning Process Know-How to the Show-How

There are two aspects of concerns expressed by the students on whether the mobile device feature and content enhance their knowledge from the perspective of the learning process from the know-how aspect to the show-how aspect: (1) Skeptical opinion on the improvement of knowledge; and (2) Improvement of knowledge.

Skeptical opinion on the improvement of knowledge. Many students were skeptical about the use of mobile technology to improve their knowledge. For example, many students (S1, S3, S4, S8, S9, S12, S13, S14, S15, S16, S17 and S20) stressed, “No, it does not improve my knowledge”; “There are many more devices for improving knowledge in a more effective way”; “In certain condition, it does improve my knowledge but mostly I do find that it is just wasting my time to study”; “I’m not aware of this because my phone has very limited feature”; “Not really. The contents and gaming applications usually replicate what we understand before”; and “No, it will make you become a loner”. Most students were reluctant to use this new learning due to their norms in the current studio-based setting. Negative behaviors were noticeable out of this observation. They lost concentration on the m-learning activities where they ended up chatting and browsing infotainment and entertainment content instead of the learning.

Improvement of knowledge. There were six students who liked the idea that mobile technology could improve their knowledge (see Figure 2). For example, some students (S2, S5, S6, S7, S11, and S18) indicated, “Yes, It does. New and interesting content influence my learning process”; “Yes, it may improve my knowledge”; “Yes, it could stimulate and activate my mind/brain work”; “Yes, the mobile phone features and function help me to communicate better and improve my knowledge”; “Sometime, it does improve my knowledge in certain condition and situation”; and “I’m inquisitive with mobile content. Mobile games are meant for fun, but not for knowledge acquisition”. These are due to the size and convenience factors of the mobile device that they could easily carry and access with them while on the go.

![Figure 2. Improvement of knowledge.](image-url)
Enhancement of Knowledge on Difficult Subjects

In terms of whether m-learning could enhance students’ knowledge on the subject that they find difficult to understand, two issues are worth noting.

Casual usage of mobile device. Many students noted that mobile technology could enhance their knowledge of difficult subjects. For example, students S1, S2, S4, S7, S8, S9, S10, S11, S13, S15, S16, S18 and S19 stressed, “No, I prefer the face-to-face learning style”; “No. The face-to-face method and textbook is the best guide to address the difficult subject”; “I do not agree. It could not enhance my knowledge on difficult subject”; “It could not enhance my knowledge on difficult subject”; “No, mobile device is for fun and communication not for learning”; “No, it’s difficult to catch up the subject using mobile device”; “I doubt that mobile device could enhance my knowledge on difficult subject”; “No, I just use it casually for relaxation”; “I do not have the experience”; and “No enhancement. I find it’s hard to learn”. It does show that 70% of the students did not notice that mobile learning could enhance students’ knowledge on difficult subjects. They perceived that mobile phones are used casually for relaxation. In fact, they found that the textbook and the face-to-face methods or learning styles are the best guide to address the difficult subjects rather than using the mobile phone as a tool. Furthermore, students have some difficulties in catching up with the subjects using mobile phone.

Acceptance on the enhancement of knowledge on difficult subjects using mobile technology. Only 30% of the students indicated that the usage of mobile technology in learning could enhance their knowledge on difficult subjects. For example, students S2, S5, S6, S12, S17 and S20 mentioned, “Yes, it might enhance my knowledge on difficult subjects namely design process subject”; “Yes, History of Art and Design Process is a difficult subject to learn. I’d like to learn this subject using mobile learning approach”; “Yes, it could enhance my knowledge on difficult subject namely design process”; “The visual communication subject may be converted into a simple mobile content for m-learning”; “Yes, it depends a lot on the subject of learning” and “Yes it may, the subject is History of Art”.

Constraints on the Learning Process

Question number four requires the students to furnish reaction to the problems that they faced with in the learning process, namely the keypad, screen resolution, navigation etc., that restrict their learning and viewing experiences while using the mobile devices. Results are presented as follows.

Usability constraint. A prevalent number of students (90%) have the same opinions with the lecturers. It is hard for them to use the keypad due to its small size and they found it easier to use the computer keyboard rather than the mobile phone keypad. Furthermore, the viewing and learning experience is not clear enough due to the small size of the screen resolution. They also faced with navigation problems due to the device feature restrictions.

For example, students S1 and S2 mentioned, “the devices get damage easily” and “I face navigation problem due to the device feature restrictions”. Meanwhile, students S3, S4, S6, S7, S8, S10, S11, S12, S13, S15, S16, S17, S18, S19 and S20 stated, “It gives too much pressure on my fingers”; “It’s hard to use the keypad due to small size. I find it easy to use the computer keyboard rather than the mobile phone keypad”; “The viewing and learning experience is not clear enough due to small size keypad and screen resolution”; “Small screen resolution. My phone does not have the advance features such as MMS, camera, video and audio”; “It is better to use touch screen function, such as i-Phone”, “Yes. Definitely, these limitation factors affect my learning process”; “The screen resolution is small and my mobile phone does not have the advance feature”; “Absolutely, these are the problematic factors”; “Its feature is unfriendly to use”; “Screen resolution
restricts my learning experience”; “Small screen could be the major problem”; “I face navigation problem in the learning process using mobile device”; “Screen resolution restricts my learning experience”; “The screen resolution degrades my interest in using mobile technology for learning”; and “The small screen frame strains my eyes in long hour’s usage”.

However, students S14 and S9 indicated, “No, I do not face any problem” and “No, it is quite fine”, while student S5 further mentioned, “These are all minor problems. My major problem is the costly phone bills”. Overall, both participants agreed that there exist numerous restrictions in the learning process while exercising the m-learning case study. Mobile phones are available in different screen size resolutions. Thus, the keypad, screen resolution and navigation restrict students’ learning and viewing experiences in their exploration of information by the use of mobile phones. All of these factors degrade the users’ interest in using mobile technology for learning.

Mobility in Learning

The final question attempts to elicit students’ opinions on the concept of mobility in learning, the application of this concept in the learning process and whether the mobile phone can replace the function of the university, in order to gain knowledge in the future. Two issues are paramount to the lecturers: (1) Inverse opinion on mobility in learning; and (2) Acceptance on mobility in learning.

Inverse opinion on mobility in learning. Contradictorily, students in Malaysia have yet to accept fully that the concept of mobility in learning is applicable to their learning process. The majority of the students involved in this research study provided inverse opinions on this statement. For example, students S1, S6, S8, S12, S13, S15, S16, S17 and S20 mentioned, “No, I do not agree”; “I do not like the concept. The mobile phone is small and it is difficult to use for learning. It could not replace the function of university in future”; and “I don’t like the concept. It could not replace the function of university”. Meanwhile, students S4 and S9 stated, “I do not think mobile phone is good for education. It is just for fun and communication purposes” and “No, I do not like mobile phones to replace face-to-face learning method. I tend to use it more for entertainment”. They perceived that m-learning would never replace conventional educational methods that they are familiar with, and it could not replace the function of universities in future. It could only complement the function of universities towards the dissemination of knowledge.

Acceptance on mobility in learning. Some of the students were reluctant to accept the new concept of mobility in learning. They preferred the face-to-face lecture and tutorial as the best media for learning instead of mobile phones. Furthermore, there are other tools for learning such as the computer and notebook. The constructive reason is that the mobile phone is small and difficult to use for learning. They sensed that the mobile phone was less suitable for education, but only beneficial for fun and communication purposes. For example, students S2, S3, S5, S7, S10, S11, S18 and S19 mentioned, “It’s not effective, because there are other tools for learning, such as computer and notebook. The mobile phone could not replace the function of university”; “The mobile phone could not replace the function of university. The mobility concept is not effective, because there are other tools for learning, such as laptop”; “No, it could only complement the function of university towards the dissemination of knowledge”; “I would give it a try. It could complement the classroom learning”; “I prefer the face-to-face lecture as the best medium for learning”; “I like the idea. It helps me a lot whenever the lecturer is away from the campus. It saves me in terms of time factors”; “I like the idea but mobile learning will never replace conventional education methods”; and “It is good to apply the mobility
concept. The mobile phone could not replace the function of university”.

Conclusions

Overall, the results explained that students were not keen on m-learning. The majority of the students did not rely greatly on the mobile phone in assessing their learning materials, such as lectures and lab sessions. They were more familiar with studio-based and face-to-face learning approaches instead of m-learning. Therefore, they were not receptive to this new idea of learning using mobile technology, even though they always used the mobile device features such as the SMS and MMS for communication, infotainment and entertainment. The limitations in the mobile device feature, costs and its usability become the prominent factors that hinder the students from fully accomplishing their m-learning exercises. This setback does challenge the lecturer on how best learning should be designed and delivered to the student, which is because the students were sceptical to this new learning approach. They could not see any relevance of using the technology within a studio-based learning setting. However, they were willing to explore the idea of using mobile technology for learning, especially in a studio-based setting. It seems that students with limited amount of allowances relied greatly on the mobile phone for these reasons. They did not see any improvement of knowledge from the perspective of the learning process know-how to the show-how on mobile technology usage for learning. They could not relate to any learning connection between mobile technology and studio-based learning, even though in the first part of the case study, the results have shown positive attitude and acceptance on the study made on a sample lesson of form, space and gestalt theory in the graphic design subject.

Furthermore, students obtained analogous experiences on small size keypads, screen resolutions and navigation which could be the major problematic factors to them and thus, affected their m-learning process as it was unfriendly to use and the device was prone to damage. They have yet to accept that the concept of mobility in learning is applicable to the learning process, apart from utilising a mobile device for casual usage. They held a belief that the mobile device is not suitable for learning. This is due to several hindrances that they faced with, namely lack of device feature, ergonomics and costs as pertinent attributes that limit their experience while conducting the sample lesson. Due to these limitations, they were sceptical towards the usage of mobile device for learning. For that reason, they generalized that the mobile device was not suitable for learning, even though, they were receptive towards the sample lesson conducted. This also led to their inverse opinion on mobility in learning. However, this limitation did not restrict the students from exploring this new learning environment in the future, since they were willing to increase their learning exposure using mobile device.

The use of mobile phones in the classroom has the potential to increase some negative outcomes or distractions such as phones ringing during class or students engaging off-task activities (e.g., sending messages to their friends). Both students and educators can benefit from an additional channel of communication—SMS messages via mobile phones—in the classroom. The lecturer perceived a gain of quality and quantity of feedback from the students. Students indicated that the system was useful—making classes more interesting and interactive. The open channel was found to be an especially useful, efficient and preferred method of communication, in comparison to the traditional “raising hands” method of asking questions, which was increasingly impractical as class sizes grew. To wrap up, the findings on knowledge transformation and discovery are important to benchmark new values of learning in the mobile learning environment for the art and design background in academic towards bridging the formal and informal settings of the learning experience. With mobile learning still in its infancy, a deeper understanding of its design principles as well as of arising opportunities and limitations is
paramount. Thus, this research has opened up a space for future researchers to deepen their understanding on the users’ perception of mobile learning. A new research extension should be set out to study how the best features of mobile technology could be used as a new curricular in the learning environment.

**References**


Web 2.0 Tools in High School in Portugal: Creating Screencasts and Vodcasts for Learning*

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In this article, we present an experiment carried out in an 11th grade class in the curricular subject of DG (descriptive geometry). In a context where failure is more in the national exam, as well as in the discipline’s attendance, the main objectives that motivated the implementation of this educational experience, were, on the one hand, to increase the interests and motivations of students for learning DG and, on the other hand, to prepare them for the final national exam. The project consisted of the development of multimedia applications based on the concept of podcast/vodcast/screencast—the geomcast. These applications were created by the teacher and students (in small groups), whose objective was to enable students to review the discipline’s curriculum contents in any place or at any time, from the Internet, iPods or mobile phones, whenever the memory needs to be refreshed, since these multimedia applications were always available in the class blog.

Keywords: DG (descriptive geometry), Web 2.0, national exam, podcast, screencast, vodcast

Introduction

We cannot remain indifferent to the changes we have been watching in the educational scope, marked by the development of the new ICT (information and communication technologies). It is necessary to rethink the practices, methods and pedagogic strategies used by the teachers, in order to contribute to the innovation in the classroom.

The issue regarding the importance of the curricular integration of the ICT is a recurrent subject regarding the educational policies, at a national and international level. For this purpose, the ISTE (International Society for Technology in Education) published in June of 2008, a report which presents the new National Educational Technology Standards (Nets-T, 2008) destined to teachers. In the referred document, new recommendations were made, directed to teachers in a sense to render them responsibility for their role as creators of pedagogic experiences that involve the use of technologies for learning and teaching.

The Portuguese government has also been showing an increasing concern with the issue regarding the ICT’s curricular integration in the teaching/learning process. In that sense, in September of 2007, the Technological Plan for Education (ME (Ministry of Education), 2007) was created, which stated that the path towards the knowledge society imposes a change in the traditional teaching and learning methods and an investment in adequate pedagogic tools, contents and materials. According to the referred document, the actions to be implemented are structured in accordance with the three main axis of action—technology, contents and training. The axis

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“contents” are particularly important in the context of the investigation we aim to carry out, since the applications which sustain them are essential for the change of the pedagogic practices, favoring the use of more interactive and constructivist teaching methods, contributing to creating a lifelong learning culture.

The DG (descriptive geometry) is responsible for the study of spatial forms, and it is also a work tool necessary and essential in several professions, such as the case of the architect, who uses DG when he/she needs to graphically solve a problem on objects in a given space. It is a discipline which develops the reasoning, the geometric rigor, and the spirit of initiative and organization.

Throughout the years, several experiments have been carried out with the purpose to solve the difficulties that the students reveal in understanding abstract elements, such as points that have no dimensions. One of the ways that has been experimented by most of the teachers, to help the relation between the geometrical objects and their representation, is model construction. These models can be as simple as an opened book, simulating the projection plans, and an eraser simulating a point or a pencil simulating a straight line. However, these models—3D applications and software which help to visualize the problem always present limitations, which begin in an insufficient simulation and, consequently, have appeared, in order to solve these difficulties. There are also several resources available in the Web but, as we could notice in our experiment with students, they revealed that they did not feel comfortable when using them, since many of these applications require previous knowledge of the curricular contents, not adapting to a teaching method that was supposed to be more personalized and adapted to the style and development of each student.

In the sense of introducing, in a creative and productive way, the highly popular Web 2.0 environments in the teaching/learning process of DG, we decided to implement a project in which the students developed multimedia applications, based on the podcast/screen cast concept—the GeomCast. It was carried out in a collaborative work logic, where the students got involved in a common task, on which the contribution of each person depends and is dependent of the contribution of the peers (Davis, 1993), and in a constructionism logic, since the students, with the help of the digital technologies, create artifacts and, by doing so, create their own knowledge: “Constructivism is the idea that knowledge is something you build in your head. Constructionism reminds us that the best way to do that is to build something tangible—outside of your head—that is personally meaningful” (Papert, 1990).

The creation of these multimedia applications will allow students to review the curricular contents in any given place or at any time, from the Internet, iPods or mobile phones and to prepare themselves, in this way, for the national exam of DG.

Meanwhile, from the moment these multimedia applications are made available in the class blog, to be used by themselves, their colleagues and also by all the cybernauts that may need to study the DG’s contents provided in the podcast, we can consider that the work developed is in conformity with the principles of the communal constructivism proposed by Holmes, Tangney, Fitsgibbon, Savage, and Mehan (2001), since the apprentices build knowledge that can be reverted in benefit of the community. According to Ramos et al. (2003), the communal constructivism can be defined:

As an approach in which the students not only learn through the construction processes of knowledge within its context and through the emergent social interactions in the learning context (social constructivism) but also in situations of active involvement in the processes of knowledge construction for the others. This is, to learn with others and learn for the others, breaking up with conventional boundaries of learning and curriculum. (n. p.)

In fact, by rendering the available contents in the Web, the students leave a record that can be useful for
others to learn with their experiences. By stimulating this kind of attitude, we contribute for the student to
to consider the school as a place where he actively participated, leaving his testimony, his trail, his brand and not
as a mere place of passage (Holmes et al., 2001).

**Web 2.0 and the Podcast**

According to Coutinho (2007; 2008), we should regard the Web 2.0 as a synonym of a new look over the
innovative potential of the Internet, which implies a more active participation of all the users, in the name of a
plural intelligence, shared or collective, strengthening the concept of information transformation and of
collaboration among the internauts, the sites and virtual services. We have changed from consumers to true
producers, while users that contribute to the structuring and construction of the content.

Also known as social and collaborative Web, the Web 2.0 shows all of us teachers and educators a new
path to follow, marked by the flexibility of the learning process, by the individual capacity to change and edit
contents, by the possibility to establish more ambitious objectives, and by the definition of new personal
strategies, interpersonal and collaborative for the construction of knowledge, through experiments carried out
with tools from the new generation Internet, such as blogs, wikis, messengers and sites like MySpace, Pandora,
Youtube, Flickr and Wikipedia (Hart, 2007).

The Web 2.0 opens to education a whole space of informality and playfulness which motivates children,
youth and adults for the construction of enriched learning and for the development of competences essential to
all of the informed citizens of the 21st century, such as being intervenient, producing contents, having critical
ability, communicating in the Web, working in collaboration and participating in communities which are distant,
but with common interests.

In a synthesis of the studies carried out over the Web 2.0 subject, Coutinho (2008) concluded that, in
general terms, the Web 2.0 tools may constitute vehicles for the development of numberless learning facts and
competences which, in formal contexts, would become many times boring and not motivating. However, the
author verifies that the blogs are the tools mostly used in the Portuguese schools, requiring empirical
investigation to evaluate the potential of other technologies, namely, the podcast, which constitutes the object
of study of the present investigation.

The term “podcasting” was coined in early 2004 by Ben Hammersley (2004), an English journalist of The
*Guardian*, to refer to the radio interviews that Christopher Lydon (Retrieved from http://blogs.law.harvard.
edu/lydondev) made in the Internet, with the help of a MP3 recorder and a pair of headphones, which allowed
proving the applicability of the weblogs to the radio.

According to several authors, the term “podcasting” is presently used to designate a form of publishing of
digital media file collections (audio, video, images, text or any other type of file) which are distributed through
the Internet. Meanwhile, several variations of the term can be noted, which tend to specify the media elements’
typology used in its production. Meng (2005) used the term “vodcasting” to specify contents composed by
video, and not merely by audio, which were generally reproduced by personal computers or in the presently
disseminated MP4. In this case, the prefix “vod” comes from the expression “video on demand” and implies the
video capture through a video camera.

Regarding the screencast, it consisted on the screen capture through which the computer users’ actions
were recorded (ELI, 2006), usually accompanied by audio (narration) and distributed through RSS (really
simple syndication).

These applications can easily be stored in blogs and Web pages. The visualization of these applications,
which can incorporate demonstrations of basic concepts, solving of exercises (including examples of how to solve them, step-by-step) and software tutorials, can be repeated when necessary and the student can watch the way a certain application is handled, listening simultaneously to the teacher’s explanations. Through this way, the student can review it when he/she deems necessary until he/she is able to understand the concepts that he found difficult, and whenever he/she needs to refresh his memory. These contents can be seen in mobile devices such as, iPods, mobile phones and MP4.

Regarding the studies carried out with the vodcast and screencast technologies, we could not find any reference to studies published in our country. In what concerns the studies carried out at the international level, we pointed out an investigation made in the Michigan University, on the use of screencasts containing explanatory mini-lectures on topics identified by the students as not very clear (Pinder-Grover, Millunchick, & Bierwert, 2008). According to the authors, the use of technology was considered to be very helpful for the students, as the impact on learning may be much greater if students and teachers learn to use this new resource. They notice that, in general, the students answered very well to the exam’s questions, which were associated to the screencast, as one can read in the final synthesis of the study: “This study suggests educational promise in the use of screencasts to supplement lecture material in large courses” (p. F1A-14). Regarding the vodcast, we found a case study carried out in the Teesside University (Gkatzidou & Pearson, 2007), in which the technology was tested, and we quote, “In order to respond to the challenge of providing truly-learner-centred, accessible, personalized and flexible learning” (p. 331). The results indicate that many students used the vodcast to review the curricular contents, but also as a part of the weekly and independent learning material. The investigators verified also that the use of the multimedia applications resulted in improvements in the students’ approval rate in the final assessment tests.

The Study

The GeomCast project was being implemented in the current school year of 2008-2009, in an 11-student-class, as five are the male and six are female, from the 11th grade (terminal year for the discipline), in a secondary school of the Oporto district. The term “GeomCasting”, created by us, is a variation of the podcast term—including the screencasts and vodcasts—in which the contexts integrate the curriculum of the DG a discipline.

The project consists the design and development of the students, working in group, as well as the teacher, of multimedia applications based on Web 2.0 tools—the GeomCasts—with the purpose of increasing the interest and the motivation of learning and, in this way, contribute to the students’ success in the national exam of DG.

In a dedicated session, the teacher presented the class with the Web 2.0 concept as well as the Jing project and several screencasts prepared by herself, teaching students how to use these new tools. Several examples of podcasts with video and audio were watched.

In the same session, a class blog was created in Word press, whose chosen name b-geometria descritiva (retrieved from http://bgeometria.wordpress.com) came up after the explanation of the b-learning (blended learning) and m-learning (mobile learning) concepts.

In conceptual terms, we considered that the GeomCasts can give much contribution by allowing a more personalized learning, where the student took on an active role as a manager and builder of knowledge (Moran, 2000), since, supported by his peers, he prepared and created his own GeomCast episode which, after being evaluated by the teacher, would be published in the blog, for the class and for the whole world. Since the suggested activities for the creation of the GeomCasts are the solutions of problems to prepare for the national
exam of DG and, as the students develop them in group, in spaces outside the classroom, we can say that, in a certain way, the development of these multimedia applications constitutes an original and innovative strategy of achieving a 3 in 1 by allowing for: (1) the learning of DG to be learner-centred (centred in the student) and adapted to his own learning style and rhythm; (2) the students to get involved in an activity in which multimedia products are created, at the same time as they study for the discipline’s national exam; and (3) an original b-learning format to be tested, in which the distance learning component is the students’ responsibility, who actively contributes, producing contents that can be useful to the colleagues and, to many other cybernauts of the Web who share the same difficulties in learning DG.

In the sense of better implementing the empirical investigation (fieldwork), four questions were formulated to guide the investigation, which sought to be understood, the development/creation of GeomCasts by the students:

1. Promotes significant learning of the DG discipline’s contents;
2. Increases the motivation and commitment of the students to learning;
3. Promotes collaborative learning;
4. What advantages or disadvantages this DG learning methodology presents.

For the purpose of assessment and monitoring of the activity, an initial questionnaire, a brainstorming session and an intermediate assessment were carried out during the experiment. When finished, a final opinion questionnaire will also be applied.

The initial questionnaire, whose design was based on an instrument developed by Costa (2008), was applied before the pedagogic activity was suggested to the students and its goals were to: (1) characterize the participants regarding variables such as, the school year, gender and age, assessment obtained in the discipline in the end of the previous school year; (2) identify the Internet access conditions; (3) evaluate the frequency and use they make of the computer; (4) catalogue resources used in the research activities for the discipline; (5) identify the difficulties felt in the research carried out in the Web for the discipline’s school work; (6) gather information on aspects regarding the DG discipline and the ICT’s (attitudes and perceptions in relation to DG); and (7) identify the preference for group work or individual work.

The intermediate evaluation was carried out in mid-February with the purpose of monitoring the work finished up to that time. For this purpose, three open questions were presented, to which the students answered in written form, using a paper sheet from their notebooks.

**Development of the GeomCasts**

Throughout the project, GeomCasts were developed in different programmatic contents which are object of assessment in the national exam, namely, the Parallelism, Perpendicularity, Metric Problems, Tangent Planes and Plane Sections.

The GeomCasts creation by the students was processed in the following manner: once the presentation of each of the programmatic topics referred to above was concluded, exercises from exams of previous years were distributed to the groups. The groups, which were carefully created by the teacher, considering the analysis of the initial questionnaire and the different levels of difficulty in order to balance in terms of knowledge (joining weaker students with good ones), would have to solve the exercises and create the applications outside the class since, due to the extension of the discipline’s program, the GeomCasts could not be created during the time destined to the presentable classes. This requirement seemed pertinent to us since it concerned with teenage
students, with ages between 16 and 18, in which the majority (eight students) had access to the Internet at home and, in the school and had access to work spaces with computers connected to the Internet.

The created GeomCasts had to be delivered to the teacher one week prior to the assessment test so that the teacher could assess them and, later on, publish them in the class blog, allowing for the consultation by the colleagues who could then take advantage of one more study elements for the final assessment test.

Regarding the GeomCasts construction process, the groups could choose the video format—vodcast—or screen capture—screencast (see Figure 1).

![Figure 1. GeomCasts created by the students.](image)

The students, who chose the video format, recorded the solving of the problem, orally justifying the steps and options made. Generally, the groups (of 3-4 elements) distributed the tasks among themselves. One student handled with the video camera; while another solved the exercise step-by-step and a third described it orally (the groups were responsible for the task distribution). The fact that each group wanted to present a good quality work (without mistakes), would lead them to carry out several attempts, until the GeomCast would fulfill their expectations. This process was very useful and effective, since the students gradually came to understand and assimilate the material without noticing that they were learning more.

In the case of the groups who chose the screencast format, the process consisted of drawing, in different supports, the several steps in the problem-solving process, which would then be scanned and inserted into a PowerPoint presentation. The final result consists in that recorded presentation, also accompanied by the oral justification of all the steps and options made by the students in the problem solving. Also in this process, several attempts were made, which contributed for the learning of the topics. Some students even commented that, if they would come to the need to solve identical exercises, they would not have difficulties.

The created GeomCasts were later on made available in the class blog and the teacher carried out its organization by programmatic contents, in a page corresponding to the 11th school year, entitled “11º ano”.

**Results**

**Initial Questionnaire**

Through the analysis of the results obtained in the initial questionnaire, we verified that nine students were 16 years old, one was 17 and another 18 years old; the grade average obtained in the discipline in the past year was 13 points. We could also verify that, in general terms, the students like the discipline (although the majority states that they only like some of the contents), and that they consider it useful for their daily life.

Regarding the group work, only one student prefers to work alone, since, from his perspective, in group work only some elements actually work. The remaining respondents prefer to work in group, justifying the
chosen option with the motives (in decreasing order of importance): (1) to make the learning process easier in
an investigation or in the solving of tasks/problems; (2) to improve each one’s sense of critical thinking; and (3)
there is greater help among each other.

In what concerns the materials used in the research, the respondents use different types of supports, with
particular emphasis on the research made on the Web and the digital support. The difficulty in finding
information on subjects related to DG was the reason indicated most by the students when inquired for the
difficulties found during research.

Regarding the use of the computer, most of the students already use it for several activities, namely, for
chatting, for text processing as well as for downloading audio and video files.

In general terms, we consider it a class with reasonable knowledge in informatics and with interest in
technologies, a necessary condition for the fulfilment of the study we aimed to carry out.

**Brainstorming**

The brainstorming was carried out during the presentation of the activity to the students, with the purpose
of gathering additional information regarding the perceptions and expectations they had, as well as the students’
previous knowledge on the concepts of podcasts/screencasts as educational resources. As a conclusion of the
brainstorming, we could notice that: (1) There was some dissatisfaction from the students regarding the concept
of Web 2.0 and its philosophy; (2) The podcast concept was familiar to only three students and that only one
had used a podcast in his iPod; and (3) The students enjoyed the idea of using Web 2.0 technologies to support
problem solving in DG. It was then decided to create a blog, which would function as a repository of the
GeomCasts created by the students and the teacher and which would also include “safe” links to guide the
students in the study.

**Intermediate Assessment**

As referred previously, with the purpose of monitoring the activity development of the GeomCasting, an
intermediate assessment was made in the end of February 2009. It regarded the presentation to the class of a set
of four opened questions, to which the students gave an individual written answer, in the end of one of the
discipline’s presentable class.

Regarding the first question made: Did you like to create the GeomCasts? Why?, all the students stated
that they enjoyed creating the multimedia applications. As an example, we quote the answers given by two of
the participants:

I enjoyed very much to make this sort of work, it’s a way of learning how to do the exercises, step-by-step. I came to
better understand the information, with this type of work (perpendicularity between lines); (A2)

I enjoyed doing, it’s a different way to learn and it’s also more attractive than using only the books, we can solve the
exercises step-by-step, making our life easier by understanding the exercise. (A7)

In what concerns the second question made: Did you like to watch the GeomCasts? Why?, six students
said yes and only one student did not answer. Once more, and as an example, we quote some of the given
justifications:

Yes, because we learned how to solve the exercises and got our doubts answered with the explanation given in the
solving of the exercise, besides being a technological format, which arises more interest; (A3)

Yes, they are useful to get our doubts on the exercises answered, and helps those who solve the exercise to better
understand it. (A5)
Regarding the third question placed to the students: Did you find this methodology useful for your learning? Why?, all the students agreed by answering positively. We quote some of the given answers:

Yes, it helps us to study and it’s a way for us to get prepared for the upcoming exam; (A3)
Yes, since it can help in the study, when we encounter difficulties. The fulfillment of more exercises may help those who solve them and the remaining colleagues. (A9)

Regarding the fourth and final question placed to the students: Which relative advantages do you find in the GeomCasts as for the two of the used capture forms—vodcast and screencast?, the opinions differ, with students placing themselves in favor of one and/or the other of the GeomCast modalities. Once more, and as an example, we quote some of the given answers:

I prefer the screencast, since its readability is much better than in the vodcast; (A7)
On one side I prefer the screencast and on the other I prefer the vodcast. In the screencast the exercise is much more readable; in the vodcast the exercise is made step-by-step but it’s not as readable. (A2)

Conclusions

Although this study is not yet concluded and, in that sense, the presented results are still preliminary, in reality, as teachers, we feel that the project already begins to give its fruits. In fact, we verified that the students showed great interest, either in the concepts explanations provided by the teacher, or the exercises made by the group, having most of the students stated that they were of great utility in the support of the study and the preparation for the final exam. On the other side, such as referred by the students in the intermediate assessment, the fact that they had to repeat the solving of the problem several times in order to obtain a GeomCast with quality meant, for the “author group”, to study with greater depth and detail the presented topic, so that their colleagues could access a clear and rigorous document, capable of helping the study and the preparation for the discipline’s assessment tests. Just as Ramos et al. (2003) pointed out, the technology enabled the creation of contents by students, accessible to anyone who owned a system connected to the Internet, in a logic of collaborative work and of knowledge sharing in which the ICT’s contributed “to the progressive enrichment of the learning environments and contexts allowing, not only the school to be the space for individual and social construction, but also each one to learn for himself and for others” (Ramos et al., 2003).

Meanwhile, with these new tools, the students cease to depend only from the manuals, written texts and/or notes made during the presentable classes. The GeomCasts allow students to learn in a more self-guided and personalized manner, satisfying the learning style and speed of each one. On the other hand, the fact that the students themselves create the GeomCasts, significantly helps in the curricular content comprehension and an approach to a constructionist type of knowledge that Papert (1980) and his colleagues defended so well. For the constructionism, human beings learn better when they are involved in the planning and construction of objects or artefacts they consider meaningful, sharing them with the surrounding community. The process of the object’s external construction is, in parallel, accompanied by the inner construction of knowledge on itself, improving therefore the cognitive capacities of the individuals. Resnick (2008), disciple of Seymour Papert, spoke of a “creative thinking spiral” where, in the interactions generated in the manipulation/creation of artifacts, “children imagine what they want to do, create a project based on their ideas, play with their creations, share their ideas and creations with others, and reflect on their experiences” (Resnick, 2008, p. 20).

These tenets motivate the development of the study we come here to present. However, it needs to be verified how the students will behave in the decisive test and the final exam of DG. Meanwhile, even if the
results of the final exam do not reveal themselves as surprising, we believe that other competences were developed—autonomy, learning to work in collaborative form and learning how to learn—and that the global balance of the GeomCast is, for that matter, highly positive.

References


The Effectiveness of the Brain-Based Teaching Approach in Generating Students’ Learning Motivation Towards the Subject of Physics: A Qualitative Approach

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The aim of this study was to measure the effectiveness of the BBTA (brain-based teaching approach) in dealing with issues related to the learning motivation towards the subject of physics amongst secondary school students in Malaysia. This research sample constitutes 100 Form Four science stream students from two science secondary school in the Northern Peninsular, Malaysia. The implementation of this study was made based on the qualitative approach using achievement analysis of the experimental group and control on pre- and post- tests. Data collection techniques involved the questionnaire of physics learning motivation, the questionnaire of student learning style, journal documentations and student interviews. Qualitative data obtained were then analyzed using the progressive focus technique and were then triangulated to obtain the required results. The findings of this study showed that the BBTA module was an effective teaching approach in dealing with the issue aforementioned. It was found that students who followed the BBTA module possessed a better physics learning motivation compared to students who received CTM (conventional teaching method).

Keywords: BBTA (brain-based teaching approach), students’ learning motivation, physics education

Introduction

In the Malaysian education scenario, it has been found that students generally lack interest towards the subject of physics compared to other science subjects in schools (Abd. Karim et al., 2006; Lee, Yoong, Loo, Khadijah, Munirah, & Lim, 1996). It has also been found that they are more inclined to avoid choosing subjects involving physics at the higher education level (Abd. Karim et al., 2006). Results from studies conducted have identified that one of the major causes that has contributed to the lack of student interest in the subject of physics in schools was ineffective instruction methods (Sidin, 2003; Syed Zin, 2003; Syed Zin & Lewin, 1993). Teachers have been found to be overly inclined towards linear instruction techniques, rote learning methods such as memorizing and notes copying, doing exercise drills and focus only on important topics to ensure their students are able to pass their exams in physics (Syed Zin & Lewin, 1993; Ngah Razali et al., 1996). This phenomenon has indirectly caused physics instruction in schools to appear to be too academic, passive and mechanistic (Malcom, 1989; Forgarty, 1992). Ideas in physics taught as abstract concepts and separated from students’ real world experience, particularly when the learning process involves only one particular type of
teaching medium, certainly makes physics education in schools a dull subject (Hestenes, 1992). Therefore, most students have been compelled to label physics as a difficult subject matter to study, thus resulting in a general lack interest towards the subject.

Thereby, it has been found that a more effective teaching strategy is needed to attract students’ attention to learning physics successfully. Latest achievements in the field of neuroscience have shown that a more comprehensive approach is required to ensure the effectiveness of a teaching and learning process (R. Caine & G. Caine, 1991; Jensen, 1996). This development fundamentally prompted novel explorations on a more brain compatible strategy known as BBTA (brain-based teaching approach).

In general, the BBTA is a strategy implemented based on the brain-based learning principles developed by R. Caine and G. Caine (1991); R. Caine, G. Caine, McClintic, and Klimek, 2005; Jensen (1996); and Sousa (1995), based on theoretical observations and latest research discoveries related to the human brain. It was designed in such a way so that it will be compatible to the structure, tendency and optimum function of the human brain, to ensure the effectiveness of a student’s learning process. Although all teaching processes are essentially brain based, compared to other methods, the BBTA is a strategy specifically created to value the true potential of the brain in a learning process. Unlike traditional methods, this approach is based on the theory that every individual keeps on learning, as long as the human brain is not prohibited from undergoing its routine processes (R. Caine & G. Caine, 1991; Caine et al., 2005; Jensen, 1996). The assumption is made on the basis of the fact that the human brain is an organ of extremely high potential and that every student is able to learn effectively, if their brain is given the opportunity to function in an optimum manner (Jensen, 1996). With emphasis on the integration of optimal learning states, involving aspects of relaxed alertness, orchestrated immersion and active processing, this strategy is believed to be able to fulfill various learning requirements whilst fostering a higher interest for the students to master the subject. Based on these characteristics, the BBTA is perceived to be a potential solution in dealing with issues related to the learning motivation towards the subject of physics amongst students.


According to this theory, each education should integrate all of these elements:

1. **Relaxed alertness—emotional climate:**
   - (a) The brain learns best in its optimal state;
   - (b) The brain’s bio-cognitive cycle influences the learning process;
   - (c) Emotions are critical to the brain’s patterning process;
   - (d) Learning is enhanced by challenge and inhibited by threat;
   - (e) Positive climate stimulates brain function;
   - (f) Appropriate environment, music and aroma excite brain activity.

2. **Orchestrated immersion—instruction:**
   - (a) The brain is unique and is a parallel processor (able to perform several activities at the same time);
   - (b) Search for meaning comes through brain patterning process;
   - (c) The brain processor works in wholes and parts simultaneously;
   - (d) Complex and active experiences involving movements stimulate the brain development;
(e) Learning engages the whole physiology.
(3) Active processing—strengthening:
(a) Learning involves both focused attention and peripheral perception;
(b) Learning involves both conscious and unconscious processes;
(c) Learning always takes place in two memory approaches—to retain facts, skills and procedures; and/or making sense of experience;
(d) The brain can easily grasp and remember facts and skills embedded in its memory space;
(e) Rehearsal necessary to retain information in the brain.

This study was designed to measure to what extent a student’s learning motivation can be generated by the implementation of the BBTA in secondary school physics education. Explicitly, this research was conducted to study the learning motivation patterns of physics amongst students who are exposed to the BBTA as compared to students who are only exposed to CTM (conventional teaching method).

This study was implemented based on the illuminative model to gather the required data where the researcher was also involved in the total process by taking up the role as both the participant and the observer in all the activities which the students are subjected to. Two data gathering methods, namely, document analysis (journal documentation) and case study (interview technique), were chosen to complete this study. The research sample constitutes 100 students: 50 in an experimental group, and the other 50 in a control group, randomly selected from two equivalent schools. The study population is Form Four science secondary school students in the northern peninsular Malaysia. The experimental group was then given the BBTA whereas the control group followed the conventional method, in learning the topic of force and motion, according to the current Form Four physics syllabus. Students involved were required to write a journal of their motivational state before and after the experimental treatment. At the same time, a structured interview session was also carried out on eight randomly selected students to verify data acquired from students’ journals.

**Implementation Strategy of BBTA**

The implementation of the BBTA this study is, in general, based on the integration of the brain-based learning principles (R. Caine & G. Caine, 1991; Caine et al., 2005; Sousa, 1995, 1998; Jensen, 1996) via seven brain compatible learning phases (Sousa, 1995; Smith, 2003), which are: (1) Activation; (2) Clarify the outcome and paint big picture of the lesson; (3) Making connection; (4) Doing the learning activity; (5) Demonstrate student understanding; (6) Review for student recall and retention/Closure; and (7) Preview the new topic.

**Research Objectives**

This study was designed to measure to what extent a student’s learning motivation can be generated by the implementation of the BBTA in secondary school physics education in Malaysia. Explicitly, this research was conducted to study: (1) the effectiveness of the BBTA in generating students’ learning motivation; and (2) the learning motivation patterns towards the subject of physics; amongst those who are exposed to this teaching method (BBTA) as compared to those who are only followed the CTM.
Research Methodology

This quasi-experimental research approach involved a sample constitutes 100 students: 50 in an experimental group and the other 50 in a control group, randomly selected from two equivalent schools. The study population is Form Four science secondary school students in the Northern Peninsular, Malaysia. Two data gathering methods, namely, document analysis (journal documentation) and case study (interview technique), were chosen to complete this study. The experimental group was then given the BBTA by the selected and trained (for at least six hours) physics teacher whereas the control group followed the CTM, in learning the topic of “Force and Motion”, according to the current Form Four physics syllabus. Students’ learning motivation from both groups was measured before and after the experimental treatment. At the same time, a structured interview session was also carried out on eight randomly selected students to verify data acquired from students’ journals. The implementation of this intervention took about three months to be completed. Data obtained from students’ journal documentation and interviews were then analyzed qualitatively using the progressive focus technique and then triangulated to obtain the required results.

Findings

Students’ Physics Learning Motivation Before the Experimental Treatment

From the 50 journals belonging to students who followed the BBTA module, analysis has found that only 11 students possess high learning motivation, 23 students possess medium learning motivation and 16 students possess low learning motivation.

In relation to that, amongst the 11 students possessing high learning motivation, six students mentioned pure interest as main inspiration, three students mentioned knowledge aspects and two mentioned the importance of physics as main stimulation for their motivation. Of the 23 students possessing medium learning motivation, seven confessed a lack of interest in the subject of physics; seven acknowledged a low understanding of physics, six found learning physics discouraging or boring, and the final three students account difficulty factors, calculations and rules as the demotivator to physics education. Furthermore, based on the 16 students possessing low learning motivation in physics, as many as seven stated that they were not interested in physics, three confessed that they did not understand physics, a further three felt that learning physics was depressing or boring, and the final three students accounted difficulty factors, calculations and rules as the demotivator to physics education.

Results from the interviews conducted verified the findings obtained from the analysis of the students’ journals. From the eight students interviewed, four students were found to possess simple motivation and the other four possess low motivation. Students A, B, C and D indicated their reasons for having medium motivation was based on the grounds of lack of comprehension, lack of interest in subjects involving calculation and also a general lack of interest in physics. On the other hand, students E, F, G and H were found to have low motivation, because they considered physics a difficult subject, in addition to being uninterested, they had an aversion to calculations and could not understand what was being studied in class. When the triangulation process has been completed, overall results showed that the responses acquired were somewhat similar to the comments written down in students’ individual journals.
As for the group of students who received CTM, based upon the 50 journals analyzed, 13 students were found to possess high learning motivation, 20 students possess medium learning motivation, while the remaining 17 students possess low learning motivation.

Among the 13 students possessing high learning motivation, as many as six students mentioned pure interest as main inspiration, four attributed comprehension as main motivator and three accounted the importance of physics in their lives as main inspiration. Of the 20 students possessing medium learning motivation, ten stated that they were not interested in physics, seven found learning physics discouraging, four reasoned a lack of understanding in the subject of physics and the other one stated that physics was a pretty tough subject to be learned. In addition, out of the 17 students found to possess low learning motivation, ten stated that they were not interested in physics, four confessed that they did not understand physics and the final three students felt that learning physics is discouraging, thus demotivating them from acquiring further interest in physics.

Results from the interviews conducted also verified the findings obtained from the analysis of the students’ journals. From the eight students interviewed, two students were found to possess high learning motivation, three students were found to possess medium learning motivation and the other three were found possess low learning motivation. Students I and II were really fond of physics and attributed their love of calculation as a key factor to the possession of high learning motivation. Students III, IV and V admitted to possessing medium learning motivation due to the lack of understanding in the subject of physics and did not enjoy studying physics. On the other hand, students VI, VII and VII were found possess low learning motivation due to the lack of amusement in the learning process, lack of interest in physics and generally did not understand physics. When the triangulation process has been completed, overall results showed that the responses acquired were somewhat similar to the comments written down in students’ individual journals.

Based on the analysis conducted, it has been found that before the experimental treatment was carried out, the overall sentiment gathered was that students possessed a low motivation in physics. Result research showed that from the total of 100 students included in this study, less than one fourth of them, which was about 23%, confessed to having a high motivation to study physics. The remaining 77% lacked the interest and were unmotivated to study physics. Results obtained also indicated that there were no huge gaps between the responses given by students in the experimental group and the control group when asked for their comments on the motivation to study physics. The most influential factors that have contributed to this motivational state include the lack of interest in the subject, lack of understanding in the taught subject, along with the viewpoint that physics education is a discouraging subject. In addition, research results showed that there were no early differences in physics learning motivational patterns between students in the experimental group and that of the control group.

**Students’ Physics Learning Motivation After the Experimental Treatment**

Results from the analysis of students’ journals from the experimental group (exposed to BBTA) showed that there was a change in physics learning motivational patterns after the implementation of the experimental treatment. It has been found that the motivational pattern of most of the students involved has turn out to be more positive. Only a small number of students still possess low learning motivation.

From the 50 analyzed journals belonging to students who followed the BBTA module, 25 students were
found to now possess high learning motivation, 18 students possess medium learning motivation, while only seven remaining students still possess low learning motivation. In contrast to the results obtained before the experimental treatment, it has been found that the major catalyst to the motivational change among the majority of the students from negative to positive is the factor of learning pleasure, enjoyment of the teacher’s teaching method and the ease of comprehension of the subject of physics.

Based on the findings of 25 students who claimed to possess high learning motivation, as many as 12 students acknowledged pleasurable learning conditions as a key factor to the possession of high learning motivation. Eight students stated that they had become more motivated when studying became easily understood. Three students placed interest as a key aspect of consideration in their motivational assessment and two students took into account the facility of strategic teaching involved in the learning process in helping them to remember more of what was being studied. From the 18 students who possess medium learning motivation, six students confessed a lack of interest in the subject of physics; five students acknowledged that they had a low understanding of physics; five students considered physics education difficult to study and the remaining two students felt that learning physics was boring. In addition, from the seven students who still possess low learning motivation in physics, as many as four students clarified that they had no interest in physics, while three more students acknowledged that they still found it is difficult to study physics, did not understood what was being taught and felt that physics education was uninteresting.

On the whole, it has been found that the number of students who have acquired high motivation has increased by over 50% from the assessment before the experimental treatment was implemented. Results acquired also showed that the BBTA implemented was able to form students’ positive perception on physics education. Only a small number of students were found to still possess low learning motivation in physics, and most of them seemed to be genuinely uninterested in the subject of physics right from the very beginning. Apart from that, results obtained also showed that in general, students did not face any problems with the implemented strategy.

Results from the interviews conducted also verified the findings obtained from the analysis of the students’ journals. From the same eight students interviewed, five were found to possess high learning motivation after the experimental treatment, while the remaining three possess medium learning motivation. Among the five students who possess high motivation, four students, namely, A, D, G and H acknowledged pleasurable learning conditions as a key factor while another, student B, acknowledged the fact that physics education is now more easily understood than before. Meanwhile, three students, namely, C, E and F admitted to possessing medium learning motivation due to a rather negative perception of the subject of physics, thereby making them less interested in the subject, less able to understand what was being taught in class, and consider physics as something difficult. When the triangulation process has been completed, overall results showed that the responses acquired were somewhat similar to the comments written down in students’ individual journals.

Meanwhile, from the 50 analyzed journals belonging to students who follow the control group (receiving CTM), it has been found that 12 students possess high learning motivation, 23 students possess medium learning motivation, and the remaining 15 students possess low learning motivation. From the 12 students who possess high learning motivation, as many as eight of them stated that they were very interested in the subject of physics, two attributed their love of calculation as a key factor and the remaining two attributed comprehension and teacher teaching styles as a key consideration. From the 23 students who possess medium
learning motivation, nine mentioned a lack of understanding of what was being taught, six stated a lack of interest, another six disliked the lessons implemented and finally, two students felt that physics was a rather difficult subject. From the 15 students who possess low learning motivation, four people confessed that physics was a difficult subject for them, four acknowledged that they had no interest at all in physics, two admitted that they did not understand what was being taught, two more admitted that physics education is boring and the remaining three attributed their dislike of physics as a subject as the main reason for possessing low learning motivation in physics.

On the overall, it has been found that there has been no apparent change in figure on the motivational aspect of learning physics in the control group (receiving CTM) from before and after the experimental treatment. This shows that conventional teaching methods (CTM) is incapable of forming students’ positive perception on physics education. Results from the interviews conducted also verified the findings obtained from the analysis of the students’ journals. From the same eight students interviewed, two students were found to possess high learning motivation after the experimental treatment, the other three were found to possess medium learning motivation while the remaining three possess low learning motivation. Students III, IV and VII were found to possess high motivation on the basis of high interest in physics, in addition to liking the teachers’ teaching style. Students II, V and VI admitted to possessing medium motivation because of lack of understanding of what was being taught in the classroom. The remaining students I and VIII admitted to possessing low motivation because they were bored by the lessons, in addition to not being able to understand the taught subject. When the triangulation process has been completed, overall results showed that the responses acquired were somewhat similar to the comments written down in students’ individual journals.

**Students’ Physics Learning Motivational Pattern After the Experimental Treatment Compared to the Pattern Before the Experimental Treatment**

This study has found that there is a change in the motivational pattern of learning physics amongst students due to the conducted experimental treatment (see Figure 1). In general, the group of students who followed the BBTA module and those who received CTM showed similar motivation learning patterns, namely: (1) The level of student motivation remained parallel to that before the experimental treatment; (2) Students’ motivation became more positive; and (3) Students’ motivation became more negative. However, data acquired showed that compared to the students who received CTM, the physics learning motivational pattern in the majority of the students who underwent the BBTA module has showed changes inclining to the positive.

*Figure 1. Motivational learning pattern amongst students before and after the experimental treatment.*
Discussion

In general, the analysis conducted found that students from the two groups, ones which follow the BBTA module (experimental group) and one which received CTM (control group) possess either high/medium/low motivation after the experimental treatment. Research results showed that physics learning motivational pattern in the majority of the students generally shifted to the positive as compared to that before the experimental treatment. However, it has been found that there were still a few students who did not benefit from any motivational change even after being exposed to the relevant lessons. Data obtained from the research conducted found that students in the group that followed the BBTA module showed a percentage increase in physics learning motivation as compared to the students within the group receiving CTM. The majority of the students within the group that followed the BBTA module have been identified to have undergone positive modification after the experimental treatment. Interview results with the students also confirmed the date obtained from the journal analysis conducted. Results obtained also showed that students who followed the BBTA module (experimental group) have acquired a higher motivation to learn physics as compared with the students who received CTM (control group).

Results obtained have also proven that an education approach based on the brain compatible is able to generate study motivation amongst students. This discovery has indirectly supported the data obtained from the implementation of quantum teaching technique (De Porter, Reardon, & Singer-Nourie, 1999) which took into account brain research as fundamental development, reportedly to be successful in increasing students’ learning motivational levels. Focused on the strategy involving the individual’s complete physiology, with consideration on suitable positive emotional elements within an optimum learning environment, this technique has been proven to be capable of attracting students’ interest to be actively engaged in the organized learning activities.

In relation to the same subject matter, it has also been found that there are three types of student motivational patterns generated after the experimental treatment. The first pattern is a parallel student motivation to that before the experimental treatment. This may be due to the fact that the student may not have benefitted from the motivational exposure generated from the implemented lessons. Due to the lack of student commitment to actively engage in the learning process, the optimum learning state may not be achievable. As a result, they may not be able to feel the positive impact of the organized activities. This may also result in the group members thinking that the strategy carried out by the teacher is not encouraging.

The second pattern is a conversion of students’ motivation into the positive after the experimental treatment. This pattern is produced when the implemented approach manages to stimulate student motivation. This implies that when technique complements students’ interests and tendencies, students will regard the teaching and learning processes implemented in the classroom as being exciting and enjoyable. In this situation, when the teachers’ delivery strategy combines well with compatible and matching learning experiences to students’ learning methods, the information internalization process of a student’s processing system can occur more efficiently. Mental conceptual relationships can also be shaped in a more systematic and flawless manner and as a result, more of the subjects delivered can be easily understood by the students, thereby making the taught subject matter more enjoyable (R. Caine & G. Caine, 1991; Caine et al., 2005; Sousa, 1995, 1998; Jensen, 1996).

The third pattern is a conversion of students’ motivation into the negative after the experimental treatment.
The phenomenon generally occurs when the teaching and learning process strategy implemented is found to be less effective in stimulating students’ interest. This is probably due to a divergence in the implemented learning approach from the students’ current learning style tendencies. In addition, other contributing factors may include a student’s lack of initiative to actively participate in the learning process organized by the teacher. When this occurs, they will find it is difficult to assimilate and process the information delivered, thereby concluding that the lesson is difficult and boring.

In relation to the research conducted, it is generally found that students’ physics learning motivational patterns are similar to students from both groups, one of which followed the BBTA module (experimental group) and one of which received CTM (control group). However, it has been found that compared to the group which received CTM, more students from group which follow the BBTA module possess higher physics learning motivation. This is probably due to the fact that the main feature of the brain-based teaching approach emphasizes on the integration of optimal learning states, involving aspects of relaxed alertness, orchestrated immersion and active student processing in an optimal learning environment, thereby greatly facilitating students’ assimilation process.

In the BBTA, knowledge/information is internalized when the teaching strategy matches that of the students’ information processing strategy. Through activities related to orchestrated immersion, it has been found that when students are exposed to various suitable techniques in an enrich learning experiences, information assimilation can be occurred as easy. This situation is supported by relaxed alertness state created in a learning environment that stimulates positive emotions in the students to perform a more efficient absorption process. Activities that stimulate students’ active processing are found to be capable of ensuring that the assimilated information is retained in the students’ storage system (R. Caine & G. Caine, 1991; Caine et al., 2005; Sousa, 1995, 1998; Jensen, 1996). In the end, learning becomes easy and enjoyable, and will result in students possessing a higher motivation to learn physics.

Conclusions

In conclusion, although generally the learning motivation patterns towards the subject of physics amongst students who are exposed to the BBTA are the same as students who followed the CTM, it has been found that the motivation to learn physics in the majority of the students who received BBTA has changed to become more positive/relatively higher than those who received CTM. Students who have been exposed to the BBTA possess a more positive/relatively higher motivation as compared to those who has followed CTM. Therefore, it can be safely concluded that the BBTA is effective in generating positive physics learning motivation amongst students.

References


“Discover Diversities”: A Trans-Inter-Disciplinary (SEMEP) Project for Different School Levels and Teachers’ Training*

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“Discover diversities” is a wide thematic developed within the SEMEP (South-Eastern Mediterranean Environmental Project) project, supported by UNESCO (United Nation Education, Science and Culture Organization). SEMEP is essentially a project for science education, focusing on Mediterranean environment. As the Mediterranean has been the cradle of Western civilization, the project also favours connection with humanistic disciplines like history and art in order to raise young people who have awareness of the Mediterranean valuable resources and its enormous cultural heritage to be appreciated and strongly protected. Moreover, SEMEP, through NC (National Coordinator), puts in touch students and teachers from different countries working on the same topics, favours mutual visits both of students and teachers, coordinates diffusion of materials (students’ worksheets and guidelines for teachers) and exchange of ideas, papers and products; in this way, schools share information and build a common knowledge. Moreover, summer schools for students and teachers coming from different countries as well as environmental competitions and stages, are often organized in a friendly environment stimulating knowledge and comparison of different cultures and experiences. In the annual meeting, the NC presents a report about activities carried out in their countries, discusses problems and proposes new topics for students’ investigations. In the present paper, we describe some SEMEP meaningful activities carried out in Italian schools.

Keywords: science education, environmental education, Mediterranean diet, diversities, SEMEP (South-Eastern Mediterranean Environmental Project) project

Introduction

The dramatic increase in knowledge about science and environment has revealed the necessity of using and applying information from all disciplines, both natural and economic-social sciences, for the solution of environmental-related problems. In fact, owing to their complexity and the large number of parameters that

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should be taken into consideration, environmental issues lie at a unique juncture of both the physical and the social sciences, incorporating components from a wide group of disciplines, such as political science, economics, management, engineering, biology, chemistry and ecology (Hoffman & Ehrenfeld, 1998). According to a study published in 1992 (D. H. Meadows, D. L. Meadows, & Randers, 1992), we are overshooting such crucial resources as food and water while overwhelming nature with pollutants like those causing global warming. We add that biodiversity is also in danger; in fact, for instance, the over-exploitation of rain forests and seas for food supply impoverishes more and more biodiversity. The problem is so important that United Nations proclaimed 2010 “Year of Biodiversity”. It is up to us to take immediate remediating steps in order to avoid the collapse of the planetary environment’s ability to support not only our species, but also much of the rest of the biosphere (D. H. Meadows, D. L. Meadows, & Randers, 2004).

The process leading to change of individual and social behaviours is long and is based on education, which should begin in early age and continue along the life.

A survey about what happened in schools after the first signs of environmental crisis may help understanding of poor success in building and diffusing at wide range environment friendly habits. After the publication of The Limits of Growth (D. H. Meadows, D. L. Meadows, Randers, & Behrens III, 1972), environment became a fashion unfortunately, and teachers thought it was their duty to propose environmental themes, even without any conviction, training and qualification. In some countries where environment became a curricular discipline, many attentive teachers observed a paradox—Students got good marks in school, while continuing in their bad behaviour towards environment out of school!

Becoming environmentalist is a philosophy of life (Neyisci, 2007). Environmental education means that issues should be faced with taking into account how they affect or are related to the environment. People are more willing to assume new attentive (even tiring and demanding) habits if they realize the way their actions have repercussions on the world around. Concepts like feedback, oscillatory phenomenal, dynamic, stable and unstable systems are basic to understand the impact of human actions on environment. So, environmental education needs scientific knowledge.

Younger generations have grown up in a time when consumer culture has become dominant. So, raising environmental awareness requests much work and students’ involvement, and teachers should have professional competences, sound science knowledge and skills in involving and guiding students into a deep insight. Students should learn about scientific concepts needed to understand and make meaningful studies, develop criticism useful to disentangle information and build a method to cope with intrinsic complexity of any environmental topic. Moreover, students should have the perception that they can be protagonist and do much to improve the environment.

European community and many international organizations, like UNESCO (United Nation Education, Science and Culture Organization) and United Nations, have identified especially in young people’s education the main road to change habits and develop the needed awareness and the responsibility for environment and community. They sponsor many environmental researches and educational programs. Special attention is given to teachers’ training encouraging interdisciplinary programs.

Indeed, interdisciplinary and trans-disciplinary teaching can help educators to implement alternative activities that could sustain a more relevant, less fragmented and stimulating experience for students.
What Is SEMEP?

SEMEP (South-Eastern Mediterranean Environmental Project) is part of UNESCO’s action in the Mediterranean region, where different cultures have developed over the past 4,000 years, promoting exchanges and cooperation among its member states in the fields of education, science, culture, communication and social sciences. It is based on successful UNESCO projects, such as the Baltic Sea, Blue Danube River, Chernobyl (and Caribbean Sea). As such, SEMEP is an educational project addressing teachers, students, and through them, their communities (Power, 1996). A primary UNESCO aim is developing the awareness of a specific “Mediterranean” among the various peoples inhabiting its shores and islands.

More in detail (see SEMEP Website) are as follows:

1. SEMEP is a holistic and interdisciplinary environmental education project within the UNESCO Mediterranean initiatives, incorporating actions for the development of greater environmental consciousness in the region;
2. It involves pupils and students from kindergarten to high secondary school level in both formal and non-formal sectors. It is intended to create an educational, environmental and cultural network for contact and cooperation among teachers and students as well as in the region that reaches beyond the school to the community;
3. SEMEP provides an opportunity to consider environmental issues that are of common concern to countries in the region. More than just another curriculum initiative, it addresses the need to promote this consciousness in school children and the community;
4. SEMEP, thus, aims at interrelating education, geared to both the natural and social environment, with cultural values. Such values are of particular importance in this part of the world (often scene of local conflicts) where the development of extremely rich civilizations involved a continuous interchange of social, philosophical and cultural values;
5. SEMEP encourages a holistic approach to education within the framework of existing school curricula. It is based on problem-identification, problem-solving, determining decision-making parameters, actual experiencing, decision-making and skills in a wide range of communication techniques;
6. The partnership involves the national coordinators which in turn organizes their annual meeting; they report about countries’ initiatives, present and share good practices, discuss about problems, especially those involving governments and funds, suggest way to involve much more the schools in lacing relationships and in favoring cooperation, choose new topics to be proposed to schools and design materials, with the support of researchers or experts, write guidelines for teachers and disseminate them, organize and carry out teachers’ training courses, environmental tournaments among schools, exhibitions and awards.

SEMEP was born from a strong support of the Greek Ministry of Education in 1994. After the issues of a pilot project, the main project began in the school year of 1996-1997 and the Italian participation dates back to that period.

Discover Diversities

“Discover diversities” has been one of the leading thematic in the SEMEP project.
Diversity is a very pregnant term which can be applied to biology, culture, anthropology and other fields, in any case, especially in a scientific context; it means a (desirable) variety, basis for evolution and progress.

In Italian schools, the theme “Discover diversities” has been a stimulus for teachers and students to
investigate different science topics, learn basic concepts and become aware that mathematics (often difficult to understand) is a powerful means to interpret and describe any, even complex, phenomenon and communicate results in a clear and synthetic language. Teachers have adapted the project to the features of their classes and surrounding territory. For example, two schools, a junior school and a high school, worked on “food and territory”. Variety in the territory means that landscape, flora, fauna and soil have different features affecting food, its quality and taste and production; Moreover, local food is affected by local traditions, history and culture, and many people now try to rediscover forgotten, genuine and natural tastes. Appreciation and consumption of local products should be encouraged—there are advantages for health (fresh food contains more vitamins, which are tasty and do not need preservatives, their production is controlled by health authorities), environment (less traffic, energy consumption and CO₂ production), and family economy (local products are cheaper). Variety and seasonal food are the best way to keep our body in good health. Alimentary education can be developed as a branch of “food and territory”; it is much important in pre-adolescence and adolescence to prevent alimentary diseases.

Feedback

An important concept to understand the complexity of systems under investigation (biodiversity is a parameter measuring both the health of a natural system and its complexity) is feedback. Feedback or retroaction is the ability of a dynamic system to keep in mind the results of the system operation to modify its own characteristics. The theory of those systems is used in many fields of sciences (including automatic controls) and biology. In this last field it is very interesting the application of the retroaction to the study of the planetary ecosystem, known as “GAIA”. The concept of feedback has been introduced by the American mathematician Norbert Wiener in the forties, while James Lovelock applied it to our planet, GAIA. The hypothesis of GAIA describes the Earth as a self-regulating system which is able to maintain its chemical-physics characteristics like mean temperature, percentages of the gases, acidity, and so on, under conditions suitable for life really thanks to the behavior of the living organisms.

We speak of positive retroaction (or feedback) when the results of the system amplify the functioning of the same system, that, in consequence, will produce greater results that will subsequently amplify the operation of the system. The systems with positive retroaction are unstable; positive retroaction typically brings the system to diverge.

An example of positive retroaction is the melting of North Pole ices. Glaciers of poles, thanks to the fact that they are white, reject the solar rays. An increase of the global temperature favors the melting of glaciers. The effect is an increase of the quantity of solar rays absorbed by the earth, causing an increase of the global temperature that increases the melting of other glaciers and so on. This system is surely unstable and tends to diverge.

We speak of negative retroaction when the results of the system damp its functioning, so stabilizing the system itself. Systems with negative retroaction are stable, because negative retroaction leads them to converge. An example of system with negative retroaction, taken by the hypothesis of GAIA is the presence of the aqueous vapor in the atmosphere. An increasing of the global temperature favors the formation of a greater quantity of aqueous vapor in the atmosphere, so raising a larger amount of clouds. Clouds, like pole glaciers, are white and therefore they reflect the solar rays. A smaller absorption of the solar rays from the Earth reduces the global temperature, and therefore, it decreases the aqueous vapor in the atmosphere. Thanks to this phenomenon, in absence of other variables, the quantity of aqueous vapor in the atmosphere tends to be stable.
On this thematic, our research group has carried out a national summer school addressed to high school science teachers. We developed experiments on mechanics, thermodynamics and chemistry, according to a trans-disciplinary perspective. Teachers studied retroaction in the physics laboratory using different kinds of servomechanisms. Usually, servomechanisms work according to the principle of retroaction, where the size of the control quantity in entry is compared to the size in exit, measured with some kind of transducers. Any difference between the size of the measured quantity and the one expected is amplified and used to drive the system in the right direction to reduce or to eliminate the error. A branch of science (theory of automatic controls) born to support and develop this type of systems. Common types of devices based on retroaction are thermostats (used to control the temperature of a confined environment) or servomechanisms used to control a position.

Observations, experiments and collection of data using a device are the best ways to understand feedback and recognize it also in other fields. In fact, examples of feedbacks can be found not only in science, even in economics and social subjects. Participants to the summer school appreciated the different perspectives opened by the unusual trans-disciplinary thematic and declared to put into practice in their classes the stimuli they received.

Methodology and Assessment

Teachers and students make use of different instruments and means for their investigations:

(1) Interviews;
(2) Work in the field (selection and observation, collection of samples);
(3) Experimental work in the science laboratory;
(4) Different sources (books, scientific reviews, official documents, internet, etc.);
(5) Data processing.

Students’ assessment and the project’s evaluation take into account: learning of scientific concepts, skills in data processing, critical thinking, coping with new open problems, according to a constructivist point of view (De Paz, Pilo, & Pastorino, 1999; Pilo, 2000).

At the end, the meaningful materials are collected in posters, reports, booklet, books and CDs for dissemination.

School Works

Now we present some works carried out by teachers with their students as example of research and good practice on “diversity” at different school levels.

Diversity in Nature: Junior School “G. Garibaldi”—Chiavari

Students of the junior school are 11-14 years old. Chiavari is a little town (about 50,000 inhabitants) in North Western Italy, about 35 km from Genoa (birthplace of Christopher Columbus), lying on the sea coast, whose east boundary is a river.

A fluvial park, included in the European Project “Nature 2000”, has been investigated by students aged 12 years. Aims of investigation are to study:

(1) The main valuable environment in the territory with its natural patrimony, geomorphology, history and culture. The river is the basic element of modelling landscape and is a resource (water for domestic use, agriculture and other human activities);
(2) The faunal Oasis: “discover” the way the river affects animals and vegetation;
(3) Modifications caused by human intervention (tourist ports, electric power plant, vegetable garden,
orchards, buildings, etc.).

It was meaningful for the class to explore features of territory around one of the main rivers of the region, celebrated by the most important Italian poet Dante Alighieri, in the 13th century.

The teacher, a naturalist, guided students to select a stretch of river, collect samples, carry out an experimental work in the school laboratory and inquire into modification caused by human interventions using interviews with old people, official documents, reports, old chronicles, paintings, pictures and even poetries and stories related to the concerned territory (see Figures 1, 2 and 3).

*Figure 1.* The river Entella: Railway bridge.

*Figure 2.* The river Entella: Oasis.

*Figure 3.* The river Entella separates two villages: Chiavari and Lavagna.
At the river mouth, two tourist ports are visible. The one on the right is considered to be the largest tourist port in the Mediterranean which can host up to 1,600 boats.

In the province of Genoa, there are more than 100 water courses, but only the Entella has the feature of a river owing to its flow.

It is very important not only as water reserve used also for hydroelectric power plant, but even for feeding beaches damaged by violent sea storms—the construction of two tourist ports at its mouth has blocked the natural feeding and now beaches are fed in artificial way highly expensive for the community.

Activities in the field are as follows:

Excursions along the river to observe the various environments: estuary and fluvial environment widely modified by man, a more natural environment upriver and collect samples to study in the laboratory.

Attention is focused on human actions and their consequences on ecosystems.

Activities have the support of worksheets prepared by the teacher to facilitate observations and collection of data. Students are provided of a net to take samples and observe organisms living there.

Data are compared with those provided by naturalist tables describing water organisms.

Students draw conclusions about the index of biodiversity in the river.

The work is part of a post-graduation thesis (Master in Didactics of Science) and it is much appreciated because it tries to build awareness towards environment on sound scientific basis, but not as a “green fashion”.

Some considerations are: Such work promotes in young people a responsible citizenship that means sensitiveness towards a common patrimony and attention towards decisions that authorities may take into concern.

Biodiversity in Nature and Human Beings: High School ITIS “Sandro Pertini”—Genzano—Roma

ITIS is a technical high secondary school (students’ age: 14-19 years). A small group of students aged 15 years has been involved in studying biodiversity.

Aims of the school are to:

1. Understand the various cultural contexts (territory, religion, history, etc.) in which biodiversity is relevant;
2. Stimulate a constructive comparison among different cultural realities;
3. Sensitise to dialogue and cooperation among peoples;
4. Appreciate and exploit different cultures.

During four months (January to April, 2008), it has been carried out an investigation about biodiversity in nature, including human beings and diet of Mediterranean peoples going so far as to discuss the current problem of shortage and famine in some countries.

The students’ group included some foreign boys, so the teacher, a biologist, proposed a survey about theories on “human races”. She intended to start a discussion, teach some important concepts of biology, stimulate a critical thinking and prevent racist attitudes.

For this purpose, a survey has been done from the French scientist Georges Buffon (1707-1788), author of the monumental work *Natural History* who perhaps has been the first to speak of “race”, passing through Johan Blumenbach (1758-1840), who classified human beings into five races, based on skin colour, Charles Darwin (1809-1882), author of *Origin of Species* (1859), up to American anthropologist Franz Boas (1858-1942), the concept of monogenesis: existence of only one humane race. The various somatic types are due to a variability existing in any species which can be hardly affected by environment.
In a society becoming more and more multicultural, education should stimulate a critical thinking, favour integration and prevent arising racism. Nowadays, in Italian schools, there is a big number of immigrants and it is a main priority to avoid any kind of violence, bullying and racist acts.

Through the SEMEP project, students have been strongly motivated to study biology and investigate similarities and diversities within Mediterranean people, especially “food habits”, such as investigation on diet, taking into account the result of questionnaires submitted to immigrants in Australia, compared four groups (see Figures 4 and 5):

1) Western group: Spain, France, Italy and Malta marked out by a large consume of pasta, meal, rice and potatoes (Spain), oil as fat, while in France, butter is used more;

2) Adriatic group: Albania, Bosnia, Croatia marked out by consumption of wheat flour bread, milk products (butter and cheese), vegetables olive oil;

3) East group: more use of products based on wheat flour and potatoes. Cheese has importance in diet. In Turkey, a distinctive vegetable—melokhia (Corchorus olitorius), is used in soup. In Egypt, dried broad beans are used for a special dish (foul medames). Consumption of Okra (Hibiscus esculentus)—fruit of an African origin plant is diffused. Tubers like Taro (Colocasia esculenta) are consumed in Egypt, Cyprus and Greece;

4) North Africa Group: frequent use of wholemeal flour—couscous is more consumed than rice, while cheese is rarely used.

Figure 4. Bread and pasta, typical food of West group people.

Figure 5. Example of spices used by West and North African groups.
Students concluded their work celebrating the “Earth Planet Day” through seminars and discussions about biodiversity decreasing owing to the ongoing climate changes.

In carrying out the investigation, different fonts have been used—scientific books, reviews and magazines, Internet, under the teacher’s supervision in order to make use of criticism and to choose reliable information.

The whole work has been summarised in a document, including photos, pictures and a 19-pages written text.

“Discover the Diversities Around Yourself: Ecological, Biological, Cultural or Technological Diversities”—Junior Secondary School “Camillo B. di Cavour”, Marcianise

It has been a long trip among the alimentary culture, the nature, the history, the myths and the traditions of this territory that, in spite of the worrying news about the social and environmental disasters, it is redeemed by the pride and the passion of its people.

Students have been guided towards a correct diet, and in the meanwhile, towards a civic conscience, sensitive to the environmental protection of our territory.

The teacher tried to carry out such task not only through rules and prohibitions, but also through more interactive and attractive approaches. She stressed the importance of the Mediterranean diet and the taste of typical local products, as they are very important both on the side of a nutritional point and as symbols and consequences of history, tradition and customs of our territory that never cease to amaze us.

Students analyzed the main elements of a healthy diet, especially for an adolescent (as they were), properties of aliment, and learnt about some important concepts like cellular breathing and metabolism.

A rapid survey about diet from pre-historical period till now puts to evidence its evolution; students also had to face basic concepts concerning biology and physics which are related to production of food and alimentation.

Questionnaires have been submitted to students to collect information about their diet and data have been processed. Recommendations and data provided by World Health Organization about Body Mass Index and guidelines for a healthy diet have been discussed in order to become aware of the correctness of their own habits and understand which changes, in case, are to be made (see Figure 6).

**Figure 6.** Graphic representation of data concerning breakfast.

**Conclusions**

A high quality learning, which means a stable learning, is the outcome of work stimulating interest,
A PROJECT FOR DIFFERENT SCHOOL LEVELS AND TEACHERS’ TRAINING

creativity, intuition, active involvement and dynamic interaction with peers and adults. Clever teachers are able to raise the conditions for a suitable learning environment, like those discussed above; their theoretical teaching/learning models have been inspired by the principles of social constructivism, while in the school daily work they favoured the cooperative learning and reflective practice (Pilo, De Paz, Fabbri, & Pastorino, 1999). Discovery has been the leading concept. Students appreciated the proposal and worked with enthusiasm, they produced booklets, video, CD-Rom and pictures; such materials, often very valuable, are now a patrimony of the schools, evidence of the engagement and work carried out.

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Going Green: Managing a Paperless Classroom

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The LMS (learning management system) at many schools for delivering, tracking and managing education relies on TEL (technology-enhanced learning), what Nichols called “pedagogy empowered by digital technology” (Nichols, 2008). It includes the “paperless classroom” in traditional (not online) classes in which faculty and students exchange information and assignments electronically. The paperless non-online classroom pedagogy is designed to improve the efficiency of the learning experience, to contribute to asynchronous learning and to help students develop the electronic skills and competencies they will need in the post-graduate private sector while contributing to the sustainability efforts of the university. The main objective of this paper is to provide a framework for managing a paperless classroom, including best practices, pedagogical issues and the “how-do-I” suggestions.

Keywords: learning, technology, pedagogy

Introduction

There are a number of practical and educational reasons for online education, including the cost of education, and the orientation of the students and faculty to and experience in using the Internet. This has led to TEL (technology-enhanced learning), what Nichols called “pedagogy empowered by digital technology” (Nichols, 2008). TEL includes hybrid classes in which faculty and students not only meet in the traditional classroom environment, but also exchange information and assignments electronically. Online classes rely completely on the latter exchange process.

The paperless classroom is a hybrid class which uses no paper handouts or tests. It is designed to: (1) improve the efficiency of the learning experience; (2) facilitate asynchronous learning; (3) help students develop the virtual environment skills and competencies they will need in the post-graduate private sector; and (4) contribute to the sustainability efforts of the university.

Improving the Learning Experience

The paperless classroom facilitates an andragogical approach to education which is more suitable for college-age learning than traditional educational pedagogy. In the latter, teaching is focused on transmitting contents. Andragogy’s objective is the learning and is focused on facilitating the acquisition of the contents (Batson, 2008).

Andragogy makes the following assumptions about the design of learning: (1) Adults need to know why they need to learn something; (2) Adults need to learn experientially; (3) Adults approach learning as problem-solving; and (4) Adults learn best when the topic is of immediate value. By comparison, pedagogy,
commonly called teacher-directed instruction, assigns students a submissive role in the learning process requiring obedience to the teachers’ instructions. A pedagogical learning approach promotes dependency on the instructor in the belief that learners need to know only what the teacher teaches them (Knowles, 1984).

In practical terms, andragogy means that instruction for adults needs to focus more on the process and less on the content being taught. Strategies, such as case studies, role-playing, simulations and self-evaluation are the most useful. Instructors adopt a role of facilitator or resource rather than the lecturer or grader.

Knowles (1984) proposed five principles of andragogy:

1. There is a need to explain the reason why specific things are being taught, e.g., certain commands, functions, operations, etc.;
2. Instruction should be task-oriented instead of memorization—Learning activities should be in the context of common tasks to be performed;
3. Instruction should take into account the wide range of different backgrounds of learners;
4. Learning materials and activities should allow for different levels/types of previous experience with computers;
5. Since adults are self-directed, instruction should allow learners to discover things for themselves, providing guidance and help when mistakes are made.

**Facilitating Asynchronous Learning**

A paperless classroom allows students access to course contents 24 (hours a day)/7 (days a week)/365 (days a year) from anywhere in the world, which facilitates self-paced learning. “Asynchronous (‘anytime’ rather than the same time) online interaction leads to new paradigms for teaching and learning. Overall, faculty reported a change in their teaching persona, towards more precision in their presentation of materials and instructions, combined with a shift to a more socratic pedagogy, emphasizing multi-logues with students” (Nancy Walters Coppola, 2001).

**Developing Virtual Environment Skills**

According to bnet.com, the world’s mobile workforce will be numbered as nearly 1.2 billion by 2013 (Ryan, 2010). “Mobile workers are those who work at least 10 hours per week away from home and from their main place of work, e.g., on business trips, in the field, travelling or on customers’ premises, and (who) use online computer connections when doing so” (Chrissafis, 2000). Adaptability, communication, planning, organization and relationship-building are key competencies required for effective mobile working (A study: Understanding & managing the mobile workforce, 2007, p. 3). These competencies can be developed and/or strengthened in a paperless classroom.

**Contribution to Sustainability**

The Brundtland Report defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Our common future, 1987). “Sustainability requires careful use of our resources, including water, air, energy, biodiversity, soil, etc., so they will be in adequate supply for the foreseeable future” (About the Center for Sustainability, n. d.).

Taking the paper as an example (These estimates are based on averages across over the authors’ collective 40 years of teaching),

1. $50 \text{ syllabi} \times 5 \text{ duplex sheets} = 250 \text{ sheets} = 0.5 \text{ reams of paper} \times 4 \text{ classes} = \sum 2 \text{ reams of paper};$
2. $50 \text{ tests} \times 4 \text{ tests/semester} \times 5 \text{ duplex sheets} = 1000 \text{ sheets} = 2 \text{ reams} \times 4 \text{ classes} = \sum 8 \text{ reams of paper};$
(3) 50 misc. handouts (quizzes, worksheets, etc.) × 5/semester × 1 duplex sheet = 250 sheets = 0.5 reams × 4 classes = ∑ 2 reams of paper;

(4) 50 written assignments handed in × 2/semester × 4 duplex sheets × 4 classes = 1600 sheets = ∑ 3.2 reams of paper.

The total is 15.2 reams of paper for one class, which are 1.52 cartons of paper per class. If we multiply that times 10 faculty members teaching four classes in a semester in a department, we will get the result of 15.2 cartons of paper.

While the proportion of institutions that see online education as a critical component of their long-term strategy appears to have reached a plateau over the past several years, public institutions (74%) believe that online is critical for their long-term strategy (Allen & Seaman, 2010, p. 2).

Paperless Classroom Pedagogy

TEL is most effective when a LMS (learning management system) for delivering, tracking and managing education is available. A major benefit is the ability to virtually adapt to the learning environment in real time, making adjustments and changes to calendar, content, assignments, assessments, etc., without having to generate hard-copy paper replacements for paper already distributed.

Class Management: Foundation

There are seven key tools for managing an effective paperless classroom which are usually provided with an LMS: (1) syllabus; (2) class calendar; (3) course content; (4) assignments; (5) assessments; (6) interactive tools including student messaging, discussions, announcements, note taking; and (7) tracking and report generation.

The basic objective of the syllabus and calendar is to provide students with an unambiguous projected roadmap as to how the class will be conducted, what learning activities there will be, when and how they will be assessed and the grading rubric.

The course content tool provides the digital files to support the learning content. A more important tool is the textbook’s Website, which typically provides students with not only digital content in the form of text and PowerPoint files, but practice quizzes, exercises, group projects and external resources, to name a few.

The assignments and assessments tools allow the posting of digital replacements for the traditional paper used for those activities.

The interactive tools support the learning process.

The tracking and report generation functions allow the professor to see, by a specified date range, an overview of general student LMS activity; how often LMS tools are used; an overview of the pages or tools most frequently used as course entry and exit points; an overview of the files viewed most frequently; and a detailed summary of activity information for individual students.

The latter is extremely useful to validate or invalidate a student’s claims that “the system” prevented her/him from accessing a tool or submitting an assignment.

It is important that all tools be accurate and integrated before the start of the semester. Mistakes, hiccups and glitches allow students to scapegoat the paperless environment for poor performance too easily.

Class Management: Implementation

It is important not to make assumptions about students’ comfort with and expertise in computers, the Internet or the LMS system. It is helpful to assess students’ self-perceptions of their skill levels with all the
three to determine what kind of training or remediation may be required so that they are comfortable with the concept and reality of the paperless classroom.

Screening questions include:

1. Off-campus Internet access (circle one): Unlimited, Sporadic, Limited, Very Limited and None;
2. Computer literacy (circle one): None, Novice, Average, Experienced;
3. LMS experience (circle one): None, Novice, Average, Experienced;
4. Library search engine literacy: None, Novice, Average, Experienced;
5. I have accounts with the following (check all which apply): Instant messaging sites (list), Social networking sites (list);
6. (Check one) I have a blog or I blog frequently.

These data provide additional information about electronic channels which could be used for the paperless classroom and how to balance project teams in terms of expertise.

An LMS tutorial was designed with the LMS administrator and made available on the LMS site. Completion of the self-paced tutorial was required by the first or second class to assure that students had basic expertise in participating in the paperless classroom and to deter or deflect future statements blaming late or missed assignments on technical naïveté.

The LMS system should be used by the professor to support the in-class face-to-face interaction. Bringing hard copy materials to class to support lectures or other learning activities weakens the intent of the paperless class.

The professor has to be consistent and timely in accessing and evaluating assignments, responding to discussions and providing feedback. Assignments submitted electronically need to be returned in an electronic format and feedbacks for LMS tests needs to be provided through the system. Requiring students to complete paper assignments or tests in the classroom subverts the basic intent of the paperless class.

Students have to take ownership of accessing the LMS class site, tools, calendar, for participating in discussions and for recognizing and meeting deadlines. That requires a consistent commitment on the part of the professor not to spoon-feed the students with information or data which is available on the class LMS site. When a student asks when an assignment is due or where the material is located, the response should be to direct the student to the calendar or to research the site to find the answer. Students should learn that this is not an arrogant response or an unwillingness to be engaging, but is no less a student’s responsibility than keeping track of paper handouts.

Other Insights

While managing the paperless classroom is greatly facilitated by the availability of a LMS for delivering, tracking and managing education relies on TEL, there are other options which utilize the resources and tools of the Internet when an LMS is not available.

We use gmail.com, for example, for the submission of quizzes and other Internet assignments which are outside of the LMS, since LMS systems are typically closed. This account is also useful for setting up surrogate LMS tools. When LMS was not available, a class website was established at a nominal cost as a subordinate site on the professors’ personal website.

Conclusions and Learning Implications

The benefits of a paperless classroom are: (1) improvement of the efficiency of the learning experience; (2) facilitation of asynchronous learning; (3) helping students develop the virtual environment skills and
competencies they will need in the post-graduate private sector; and (4) contributing to the sustainability efforts of
the university. The traditional paper-dependent learning experience and subsequent paper trails are replaced with a
more efficient electronic creation, file storage and maintenance, and exchange of information and feedbacks.
Learning performance is more easily assessed and recorded, which permits quicker evaluation of the effectiveness
of specific learning activities. As a result, documentation of the assurance of learning is greatly facilitated.

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Literature and Empowerment: A Study of Multicultural Grade

Three Classes Overachieving in Reading*

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The objective of this mixed methods study is to gain insights into how teachers can assist their students to become good readers who read with joy and engagement. This study describes multicultural classrooms in a low-SES (socio-economic status) Stockholm area, representing reading communities, where reading fiction is the heartbeat of classroom life. Teachers’ ways of relating to their students, their methods and assessment procedures will be discussed. The creation of the classroom climate, the fun factor, parents’ roles and collaborative aspects of teachers’ work also protruded as major themes in the teachers’ narratives. The analyses employ the concepts of the Proximal Zone of Development and Scaffolding from Vygotsky’s theories, together with the concepts of weak and strong framing as well as classification from Bernstein’s Code Theory. Teachers’ ways of relating to phenomena such as deficit syndrome and colour blindness will be analyzed from critical perspectives. Since the practitioner’s perspectives are paid much attention to, issues like the need for the employment of broad theoretical perspectives, trans-disciplinary research approaches and mixed methods will also be discussed.

Keywords: empowerment, bilingual readers, elementary school, literacy, literature

Introduction

Predictors of reading achievement such as home literacy environment, early literacy experiences including parent-child interactions, and reading patterns in the home were well established by early researches (Heath, 1983; Sénéchal & LeFevre, 2002). So were linkages between reading achievement and socio-economic factors such as level of parental education, occupation, income and residential setting (Coleman et al., 1966; Priciotta, Flanagan, & Germino, 2006; Rutter & Maugham, 2002). These findings suggesting a strong impact from home literacy activities and socio-economic factors on reading achievements may give rise to deterministic attitudes towards children’s possibilities to become proficient readers and even contribute to arguments questioning the role of formal schooling.

However, to succumb to the idea that schooling does not seem to make many differences in accounting for individual differences in reading achievement, would also be to succumb to prevalent power structures, that is, letting patterns of inequity in a society reproduce without further transformative disruptions. The quest to reduce the negative impact of socio-cultural factors on reading achievement has been proven to be an area where teachers’ work has a potential to make a difference (Darling-Hammond, 1994). Actions to increase the quality and the quantity of reading instruction have the potential to enhance reading performance in low-SES (i.e., socio-economic status) areas (Sadoski & Wilson, 2006). Highlighting successful educational approaches is a

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way to demonstrate that pedagogy may have transformative effects. The overarching objective in this study was to examine how teachers and their educational practices can make a difference, and also further scrutinize how this pedagogy was enacted by teachers and students, with a particular focus on L2 (second-language) learners.

From Reading to Literacy

Two major poles can be identified in the field of reading theory concerning views on reading and reading acquisition. On the one hand, the metaphor of information transfer dominates, advocating a psycholinguistic view on language as a self-contained symbolic system, where meaning is believed to reside in the text (Gough & Tunmer, 1986). On the other hand, reading is described as participating in a socially, culturally and historically constructed practice (Gee, 1996; Street, 1995). Functions of literacy are viewed as cultural capital, and as such reflecting relations between knowledge and power (Bourdieu, 1984). In this enlarged definition of literacy, not only the text but also the reader’s prior experiences of the world, social identifications, attitudes, and the surrounding culture and society contribute to the constructions of meaning. In the present study, a pragmatic view on reading acquisition was applied, where knowledge was seen as constructed both “in the head” and “in the world” (Gee, 1992, p. 12). However, transactional perspectives on reading development were emphasized, in order to encompass also social, emotional and cultural factors intertwined and interdependent with cognitive factors in a classroom setting (Atkinson, 2002; Vygotsky, 1978).

Vygotskyan Theory: The Zone of Proximal Development and Scaffolding

The ZPD (zone of proximal development) is a key concept in this study (Vygotsky, 1978). Standardized tests may be used to establish the individual’s lowest level of achievement in the ZPD, often positioning second-language learners as low achievers. However, the teachers’ view of a culturally diverse classroom environment as a potential for higher-order conceptual enrichment might set the scene for learning aiming at the upper limit of the ZPD. Culturally, sensitive educational practices might have consequences for students’ learning progress, as well as teachers’ choices of assessment procedures, instructional methods and materials (Bernard, 2004). More advanced peers, teachers and scaffolding structures mobilize learners to exceed their individual limits of achievement, and thus, facilitating learning both at individual and social level (Vygotsky, 1978).

Critical Language Theory: The Deficit Syndrome and Colour Blindness

As discourses are not equal in school, students with diverse backgrounds and divergent language skills may be subordinated as part of a collective of deficient communicators. Among educators, the deficit syndrome as a discourse emphasizing disabilities rather than abilities was well documented (Au & Raphael, 2000; Heath, 1983; Delpit & Dowdy, 2002; Shohamy, 2004). Instead, the awareness of children’s capabilities and potentials is paramount in creating positive conditions for children’s learning processes. The affinity between students’ agency and the Vygotskian concept of learning related to the idea of reading proficiency as a presumptive tool for empowerment with regard to students’ knowledge of and familiarities with the genres used in school (Bernard, 2004; Cummins, 1996, 2007; Freire, 1970; Freire & Macedo, 1987).

The students who lack discourse skills and knowledge about school and teacher implemented expectations are often disadvantaged in educational settings. Teachers’ liberal ways of assuming that all students share similar opportunities are referred to “colour blindness” (Kubota, 2004). By ignoring the power structures in action, marginalized learners become even further marginalized, and students with diverse cultural backgrounds were left in a void, without guidance to acknowledge appropriate behaviour in a school context (Gee, 1996; Giroux, 2001; Siegel, 2006). Linguistic and cognitive development together with code knowledge was described by
Cummins (1996) as joint factors vital to enhance the ownership of language and educational trajectory.

**Bernstein’s Code Theory: Weak Framing and Swedish Schools**

Employing Bernstein’s (1971) Code Theory on Swedish schooling rendered a description of classrooms with predominantly weak framing and classification. Students with diverse cultural backgrounds often arrive in Sweden from countries with strong framings, explicit rules and overt expectations. Researches have shown the importance of making invisible codes and expectations clear to those students, in order to enhance their academic successes (Gustavsson, 2001). Educational practices denoted as “your own work”, are very common in Swedish schools and may cause problems since students simply do not know what is expected of them (Cederberg, 2006).

**Are Schools and Classrooms Making a Difference?**

**School characteristics.** A school policy and a school leadership with a focus on language were features mentioned in several studies of high-achieving schools with multi-cultural student bodies (Cummins, 1996; Hallinger, 2003). Academic emphasis, encompassing high expectations and academic demands, were additional features reoccurring in high-achieving schools (Parker, Hannah, & Topping, 2006).

**Classroom characteristics.** Situated learning is highly dependent on the affordances offered in the classroom context. Students’ perceptions of the school climate as being positive constituted a reoccurring characteristic of high-achieving classes, as were positively perceived relations between the teacher and the students, peer relations and a collaborative rather than a competitive classroom climate (Brophy, 2005; Langer, 1999; Parker et al., 2006). Holistic and interactive approaches to the development of literacy proficiency encouraging higher-order thinking and discussion of ideas have been proven successful in multilingual settings (August, 2006).

The linkage between the amount of reading and students’ reading proficiency was well documented (Stanovich, 2000; Wigfield, Guthrie, Tonks, & Perencevich, 2004). The amount of reading was often viewed as a result of reading in the spare time, but there was evidence that reading in school might serve the same purpose (Barbosa, Ramos, Arájo, & Almeida, 2006). Access to books, free book choices, along with sufficient time designated to reading and discussions of texts are additional features observed in high-achieving classes (Gambrell, 1996).

One approach to reading instruction seldom dominates in high-achieving classes. Cross-curricular connections across grades, subjects and lessons, as well as in and out of school contexts distinguish higher-performing classes (Gambrell, 1996; Hammond, 2001; Langer, 1999).

**Culturally sensitive classrooms.** Relations to print and also to ways of learning, showed strong linkages to the cultural setting and cultural sensitivity may enforce pedagogy (Au & Raphael, 2000; Cummins, 1996, 2007; Delpit & Dowdy, 2002). However, cultural sensitivity may be enacted in several ways. To account for cultural divergences, it is fundamental for literacy acquisition to promote students’ understandings of the role and function of print in an educational context. This approach should be well integrated in formal teaching (Snow, Burns, & Griffin, 1998). Viewing oneself as a reader and a writer also becomes a vital part of one’s personal and social growth (Pavlenko, 2002; Verhoeven & Snow, 2001). Cultural sensitivity also includes relations between home and school, and studies have shown that well established cooperation between parents and teachers promoted students’ learning (August, 2006; Baker, 2003; Drummond & Stipek, 2004; Van Horn, 2000).

Clearly expressed goals, overt hands-on information about tasks, elements of explicit instruction, role
modelling and sufficient support along with work on language across the curriculum exemplified scaffolding strategies identified to promote L2 learners’ literacy developments (Cummins, 1996; Fitzgerald & Noblit, 2000; Gibbons, 2002). In addition, scaffolding progressively adjusted to students’ needs plays a major role in the students’ reading development (Hammond, 2001). With this respect, the use of dynamic assessment procedures, connected to learning processes, has gained attention as a means to promote L2 learners’ reading developments (Darling-Hammond, 1994; Shohamy, 2004). Cummins (1996) emphasised the acquisition of academic language as a threshold to equal educational opportunities. According to Cummins (1996), interaction must be grounded in students’ current understandings, and gradually proceed from a contextual level to more de-contextualized levels, providing cognitive and intellectual challenges at appropriate levels.

Literature-based programmes might have positive influences on non-mainstream students’ attitudes towards reading, presupposing that their reading acquisition develops successfully (Au & Raphael, 2000; Bernard, 2004; Elley, 1991). Critical skills for reading comprehension related to the habitual reading of fiction, which also affect non-fictional comprehension, are for example knowledge about text-structure, strategies for self-monitoring and integration skills together with growth of the vocabulary (Cain, Oakhill, & Bryant, 2004; Collins Block, Gambrell, & Pressley, 2002).

There was also a linkage between L2 learners’ oral performances and reading achievements (Holdaway, 1979). For example, L2 learners’ engagement in oral activities in daily classroom life, such in drama, has been observed to promote language proficiency (Hammond, 2001; Miller, Heilman, & Nockerts, 2006; Wolf, 1998).

The Present Study

The main objective of this study was to identify students’, classrooms’, teachers’ and teaching characteristics of low-SES, multicultural classes overachieving in reading. One major concern was to avoid the self-evident effects of socio-economic and language factors, and thus, overachieving classes were defined by controlling such factors using regression as well as twin-matching procedures. Questionnaire data addressed differences in students, classrooms, teachers and teaching factors between overachieving classes and control classes matched on SES and language. In addition, interview data were used to explore in more depth how teachers went about in their activities, how the classroom climate was created, and how social interactions among teachers, students and peers were linked to reading development. Thus, teachers’ voices were included to complement the statistics and shed light on the research questions (Johnson & Onwuegbuzie, 2004).

Method

Participants

In an earlier study comprising a total of 1,092 classes at Grade 3 (i.e., nine years old children) in the Stockholm area, Sweden, 94 OA-classes (overachieving classes) and 94 underachieving UA-classes in reading comprehension were identified after matching for SES and language backgrounds (Damber, Samuelsson & Taube, in press). Based on regression analyses, overachieving classes were those performing well above (positive residuals above the 85th percentile) the expected mean reading performance predicted by one index of SES, number of books in the home. This index of SES was validated by high correlations between the number of books on the one hand and parental income and educational level on the other hand (the correlation coefficient, \( r \), varies from 0.56 to 0.68, on a scale where \( r \) ranges from -1 to +1; +1 = perfect correlation, -1 = inverse correlation) with an average correlation of 0.62. Underachieving classes were those performing well below (negative residuals below the 15th percentile) their expected level. In addition, these OA-classes and
A STUDY OF MULTICULTURAL GRADE THREE CLASSES OVERACHIEVING IN READING

UA-classes were also matched on language background using a twin-matching procedure so that the percentage of students with Swedish as a L2 within classes was equal across groups.

A closer examination of all 94 OA-classes revealed a number of classes from one particular low-SES school district with high percentages of students with diverse cultural and language backgrounds. There were a total of 68 out of 1,092 classes in this school district. Of the 68 classes in this area, 38 classes performed as predicted based on SES and language background, and 22 classes were underachieving. However, there were eight classes within this school district with a mean reading performance clearly above their predicted level. These eight OA-classes were targeted in the present study.

In order to add to the quantitative descriptions of the OA-classes ($N = 8$), a group of 100 control classes were selected from the original sample ($N = 1,092$). These control classes were matched with the eight OA-classes on the number of books in the home, the percentage of parents with at least post-secondary education, family income in terms of percentage of families with a yearly income exceeding 360 thousand Swedish kronors, and the percentage of students with Swedish as a second language (Stockholm Office of Research and Statistics, 2007). The remaining classes were used as a reference group ($N = 984$). Group characteristics are presented in Table 1.

Table 1

<table>
<thead>
<tr>
<th>Matching variables</th>
<th>OA-classes ($N = 8$)</th>
<th>Control group ($N = 100$)</th>
<th>Cohen’s $d$</th>
<th>$t$-test</th>
<th>Reference classes ($N = 984$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading test results</td>
<td>22.08 (1.48)</td>
<td>18.29 (2.81)</td>
<td>1.69</td>
<td>3.76**</td>
<td>20.72 (2.3)</td>
</tr>
<tr>
<td>Number of books</td>
<td>79 (51)</td>
<td>104 (50)</td>
<td>0.50</td>
<td>1.36</td>
<td>171 (65)</td>
</tr>
<tr>
<td>Percent of parent education (%)</td>
<td>31.19 (8.80)</td>
<td>27.37 (9.41)</td>
<td>0.42</td>
<td>1.11</td>
<td>41.1 (13.1)</td>
</tr>
<tr>
<td>Family income (%)</td>
<td>4.78 (3.31)</td>
<td>3.77 (3.44)</td>
<td>0.30</td>
<td>0.80</td>
<td>9.26 (6.53)</td>
</tr>
<tr>
<td>Other first language (%)</td>
<td>65.69 (35.06)</td>
<td>65.71 (20.36)</td>
<td>0.00</td>
<td>0.00</td>
<td>16.0 (20.2)</td>
</tr>
</tbody>
</table>

Notes: $^* p < 0.05; ^{**} p < 0.01$; Cohen’s $d$ was used as an effect size measure.

Six informants active in the eight OA-classes were subjected to in-depth interviews. These informants were fully informed about the project, participated voluntarily and were reported back to, in order to ensure the acceptance of the authors’ descriptions (Kvale, 1996). Three teachers, one librarian, one preschool teacher and one programme administrator were interviewed, all of whom with many years’ experience.

Reading Comprehension Test, Student Questionnaire and Teacher Questionnaire

Reading comprehension test. The reading test consisted of a paper-and-pencil test with six texts from the IEA (International Association for the Evaluation of Educational Achievement) reading literacy study conducted in 1990/1991 (International Association for the Evaluation of Educational Achievement). The maximum score was 26 points. The domains of reading materials, intending to reflect different aspects of reading comprehension, were narrative prose (two texts including 11 items), expository prose (one text including six items) and documents, such as a map and a schedule (three texts including nine items).

Student and teacher questionnaire. A student questionnaire containing 31 questions focusing on background data, self-rated reading ability, reading behaviour, access to books and daily papers, parents’ story
book reading and satisfaction in relation to school work and peers was administered. Eight of the questions were dichotomous, one of the questions was continuous variable and 22 of the questions employed a Likert-scale. In addition, a teacher questionnaire with a total of 29 questions was used covering background data, years of education and teacher experience, years in the class, perceived needs and problems, degree of parental cooperation, perceptions of relations, students’ attitudes and working climate. Information about the class, such as the class size, questions related to teacher instructions, aims for teaching, methods used and assessment routines were also included. When examining the use of methods to stimulate reading, the answers reported the frequency of the use. In the question examining goals for reading instruction, the teachers were asked to rank different alternatives, 14 of the questions were dichotomous, eight of the questions were continuous variables and six of the questions employed a Likert-scale.

In-Depth Interviews

Telephone interviews were performed, recorded and transcribed. Translations into English were made by the author. Interviews have lasted from 45 to 120 minutes. Although the interview guide was thematically structured (collaborative aspects, parental contacts, use of methods, etc.), the aim was to let the dialogue spin off naturally, with the participants directing the course, since the participants’ voices and perspectives were at focus. The interview guide was used to check that all the themes were covered. In order to make sure that answers were interpreted according to the interviewees’ intentions, follow-up questions were subsequently asked (Kvale, 1996). As a school’s collective memory is believed to stretch back in time for 8-10 years, also former experiences of the members of staff are still accessible to the interviewer (Mosenthal, Lipson, Tomcello, & Mekkelsen, 2004). The interview data were compared, coded and categorized with respect to its contents.

Statistical Procedures

As it appeared neither possible, nor meaningful to report all the results, only significant differences between the OA-classes and the control classes were reported in the tables. As the results from the student questionnaire showed no significant differences, those results were only commented upon. T-values were calculated to explore the mean differences between OA-classes and the control classes, and Cohen’s $d$ was used as an effect size measure. A high value on any variable derived from the two questionnaires equals positive attitudes, positive conditions, high priorities, etc.. Findings reaching significance using $t$-tests are given priority. However, the author has chosen to comment on some non-significant results with an effect size exceeding 0.50 to cover aspects emphasised as important by the informants.

Statistical Results

Non-significant Differences

No significant differences between the OA-classes and the control classes were found concerning students’ characteristics such as home literacy environment indicated by measures of access to a daily paper, books in the home and literacy events in the home as parents’ story book reading in pre-school. On measures of voluntary reading and early reading abilities, such as being able to read letters and words before school start, no significant differences were found. Neither any differences indicated on measures of self-rated reading ability. However, the effect size measure indicated impact on the measure of self-rated reading ability (0.79), which was perceived as better by the students in the OA-classes. Also, on the measure of a number of students receiving special education in Swedish, an impact was indicated by the effect size measure (0.63) with less
students in the OA-classes receiving special education even though the differences between the OA-classes and the control classes were not significant.

On the measures of classroom characteristics, no significant differences were indicated on a majority of the questions. No differences were found concerning class characteristics, such as the class size, multi-graded classroom organisation, the number of teachers in the class or the percentage of children with reading or writing difficulties. No significant differences were found on access to special education teachers, home language teachers or other teacher resources. Neither any difference was indicated on measures of access to school or classroom library, nor did students’ attitudes towards school work differ significantly though the effect size measure indicated some impact (0.82), attitudes being more positive in the OA-classes.

Concerning the teachers’ and teaching characteristics often debated factors such as teacher education, in-service training and teacher continuity, they showed no significant differences. Neither significant difference was found between the classes on the measures of parental contacts, nor did the measures of aims of the teachers reading instructions or their perceptions of the Swedish lessons show any differences. On the measure of the teachers’ perceptions of students’ needs of special education in Swedish, an impact of the differences was indicated by the effect size measure (0.69), these needs were perceived as lower in the OA-classes. On one measure of teachers’ frequency of using different methods to stimulate reading and the writing of book reviews, there was also an impact (1.3) as shown by the effect size measure, this activity being more frequent in OA-classes, even though no significant differences were indicated.

**Significant Differences**

Apart from two measures of classroom characteristics, students’ perceptions of peer relations being more positive, and teachers’ perceptions of their possibility to meet the demands in the classroom, all the other significant differences concerned with teachers’ and teaching characteristics.

**Table 2**

*Mean and Standard Deviations (Within Parenthesis) on Students’ Characteristics of Overachieving Classes and the Control Group Matched on SES and Language. Reference Classes’ Results Are Also Reported*

<table>
<thead>
<tr>
<th>Students’ characteristics</th>
<th>OA-classes (N = 8)</th>
<th>Control group (N = 100)</th>
<th>Cohen’s d</th>
<th>t-test</th>
<th>Reference classes (N = 984)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students’ reading &amp; writing difficulties and Swedish as first language (%)</td>
<td>2.50 (5.59)</td>
<td>15.38 (19.36)</td>
<td>0.92</td>
<td>1.90</td>
<td>9.50 (11.6)</td>
</tr>
<tr>
<td>Number of students receiving special education in Sweden</td>
<td>1.38 (1.69)</td>
<td>2.82 (2.78)</td>
<td>0.63</td>
<td>1.44</td>
<td>2.10 (1.85)</td>
</tr>
<tr>
<td>Self-rated reading ability</td>
<td>9.45 (0.55)</td>
<td>8.91 (0.80)</td>
<td>0.79</td>
<td>1.87</td>
<td>9.31 (0.71)</td>
</tr>
<tr>
<td>Parents’ story book reading (pre-school)</td>
<td>2.57 (0.25)</td>
<td>2.39 (0.42)</td>
<td>0.52</td>
<td>1.19</td>
<td>2.61 (0.42)</td>
</tr>
</tbody>
</table>

Notes. *p < 0.05; **p < 0.01; In the reported results, the impact of Cohen’s d exceeded 0.50.

**Classroom characteristics.** Significant differences were indicated between the measures of peer relations and teachers’ perceived possibility to meet demands in the classroom. Students’ attitudes were perceived as more positive in the overachieving classes compared with the control group.

Table 3
A STUDY OF MULTICULTURAL GRADE THREE CLASSES OVERACHIEVING IN READING

Mean and Standard Deviations (Within Parenthesis) on Classroom Characteristics of Overachieving Classes and the Control Group Matched on SES and Language. Reference Classes’ Results Are Also Reported

<table>
<thead>
<tr>
<th>Variables</th>
<th>OA-classes</th>
<th>Control group</th>
<th>Cohen’s d</th>
<th>t-test</th>
<th>Reference classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom characteristics:</td>
<td>(N = 8)</td>
<td>(N = 100)</td>
<td></td>
<td></td>
<td>(N = 984)</td>
</tr>
<tr>
<td>Students’ perceptions of peer relations</td>
<td>2.73 (0.14)</td>
<td>2.50 (0.21)</td>
<td>1.29</td>
<td>3.04**</td>
<td>2.69 (0.19)</td>
</tr>
<tr>
<td>Teachers’ perceptions of student attitudes</td>
<td>17.71 (1.50)</td>
<td>16.08 (2.41)</td>
<td>0.81</td>
<td>1.90</td>
<td>17.01 (1.92)</td>
</tr>
<tr>
<td>Meet demands</td>
<td>29.38 (2.97)</td>
<td>25.48 (4.28)</td>
<td>1.06</td>
<td>2.52*</td>
<td>27.31 (3.84)</td>
</tr>
</tbody>
</table>

Notes: *p < 0.05; **p < 0.01; In the reported results, the impact of Cohen’s d exceeded 0.50.

Teachers’ and teaching characteristics. OA-teachers had on average a job experience which was eight years longer than those in the control group. No significant differences were indicated between measures of teacher education, aims of the teaching of reading or methods used for reading instruction. The results of the measure on methods used for reading instruction indicated that 39% of the control group used several basals, compared to none of the OA-teachers. Significant differences were also indicated among measures of procedures of assessment, OA-teachers consequently use the same assessment procedures. In the frequencies of the use of methods to stimulate reading, significant differences in dramatizing stories, writing letters to the author, and the author’s visits were indicated, these methods being more frequent in the overachieving classes compared with the control group.

Table 4
Mean and Standard Deviations (Within Parenthesis) on Classroom Characteristics, Teacher and Teaching Characteristics for Overachieving Classes and the Control Group Matched on SES and Language. Reference Classes’ Results Are Also Reported

<table>
<thead>
<tr>
<th>Variables</th>
<th>OA-classes</th>
<th>Control group</th>
<th>Cohen’s d</th>
<th>t-test</th>
<th>Reference classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom characteristics:</td>
<td>(N = 8)</td>
<td>(N = 100)</td>
<td></td>
<td></td>
<td>(N = 984)</td>
</tr>
<tr>
<td>Students’ perceptions of peer relations</td>
<td>2.7 (0.1)</td>
<td>2.5 (0.2)</td>
<td>1.29</td>
<td>3.04**</td>
<td>2.7 (0.2)</td>
</tr>
<tr>
<td>Teachers’ perceptions of student attitudes</td>
<td>17.7 (1.5)</td>
<td>16.1 (2.4)</td>
<td>0.81</td>
<td>1.90</td>
<td>17.0 (1.9)</td>
</tr>
<tr>
<td>Teachers’ perceptions of possibilities to meet demands</td>
<td>29.4 (2.9)</td>
<td>25.5 (4.3)</td>
<td>1.11</td>
<td>2.52**</td>
<td>27.3 (3.8)</td>
</tr>
<tr>
<td>Teacher and teaching characteristics:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher experience (years)</td>
<td>22.6 (12.5)</td>
<td>14.6 (9.7)</td>
<td>0.71</td>
<td>2.19*</td>
<td>15.5 (11.1)</td>
</tr>
<tr>
<td>Need of extra resources</td>
<td>1.5 (0.8)</td>
<td>2.5 (1.4)</td>
<td>0.88</td>
<td>2.02*</td>
<td>1.0 (1.2)</td>
</tr>
<tr>
<td>Reading instruction using several basals</td>
<td>1.0 (0.0)</td>
<td>1.4</td>
<td>3.11</td>
<td>2.24**</td>
<td>1.4 (0.0)</td>
</tr>
<tr>
<td>Flexibility in use of assessment procedures</td>
<td>2.6 (0.5)</td>
<td>3.8 (1.0)</td>
<td>1.50</td>
<td>3.41**</td>
<td>3.8 (1.1)</td>
</tr>
<tr>
<td>Methods stimulating reading such as:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dramatizing stories</td>
<td>1.1 (0.4)</td>
<td>0.8 (0.5)</td>
<td>0.88</td>
<td>2.13*</td>
<td>0.7 (0.5)</td>
</tr>
<tr>
<td>Writing book reviews</td>
<td>1.1 (0.4)</td>
<td>0.8 (0.8)</td>
<td>1.30</td>
<td>1.29</td>
<td>1.1 (0.7)</td>
</tr>
<tr>
<td>Letters to the author</td>
<td>0.6 (0.8)</td>
<td>0.1 (0.3)</td>
<td>0.83</td>
<td>3.94**</td>
<td>0.1 (0.3)</td>
</tr>
<tr>
<td>Author’s visits</td>
<td>0.6 (0.7)</td>
<td>0.2 (0.4)</td>
<td>0.73</td>
<td>2.67**</td>
<td>0.2 (0.5)</td>
</tr>
</tbody>
</table>

Notes: *p < 0.05; **p < 0.01; In the reported results, the impact of Cohen’s d exceeded 0.50.

Joint Analyses if Quantitative and Qualitative Results
The statistical results and the contents of the interviews were analyzed in the light of one another to enable a synthesis of qualitative and quantitative results. Quotations encompassing views expressed by all informants were cited in the text without individual references. Five major themes gradually emerged.

**Participating in reading communities.** The picture of reading and learning communities emanated with the reading of fiction as the heartbeat of the classroom life. Fiction created a shared frame of reference for literacy activities, providing individual, interpersonal and transactional experiences and learning. On a daily basis, time was designated to silent reading which supported earlier findings that the link between the amount of readings and reading achievements could be sustained by classroom work (Barbosa, Ramos, Arájo, & Almeida, 2006).

Statistics indicated restricted use of pull-out strategies and low needs for extra resources, according to teachers’ perceptions. Those results were in concordance with teachers’ voices depicting classrooms where inclusion was the motto, whatever language level students were at. Group work, pair work such as pair reading and individual work were employed in rather equal proportions. The setting was described in the following way:

> The aim is to let every child feel competent… This thing is about having read a book. No matter how tiny it is. You have read it. You understand some of it. You could express it in words and tell others about it… To write or express orally… or to dramatize or draw a picture. Everybody could find their places irrespective of their language levels. (Teacher’s narration)

Interviews revealed a massive encounter with print, starting already in pre-school: books, authentic messages on the white board, scribbling, memorizing stories, pretended reading, multi-modal activities promoting print awareness and curiosity about print, to enhance further development (Sénéchal & LeFevre, 2002; Snow, Burns, & Griffin, 1998).

Classrooms provided lots of affordances. A multitude of books, on divergent topics and language levels to satisfy all the needs, provided reading materials, which was a feature described as a characteristic of classrooms with high achieving readers (Gambrell, 1996; Mosenthal, Lipson, Tomcello, & Mekkelsen, 2004; Langer, 1999). The availability of reading materials, according to free choice and irrespective of language level, supported learning experiences in the ZPD. Teachers described how a few classroom rules in combination with a very deliberate work on self-reliance and acceptance of all peers helped create a positive classroom climate, a result was also sustained by statistics. Peace and quiet characterized the classrooms, and positive feedback was emphasised, especially in the first stage of learning, since the teachers were well aware of the different stages in L2 learning (Pienemann & Håkansson, 1999).

Oral activities were given high priority with great acceptance of the diverging language levels students were at, thus encouraging the sound of multiple voices in the classroom and paying attention to the linkages between oral proficiency and reading proficiency (Gibbons, 2002; Miller et al., 2006). One interviewee commented that they got very good at that… to speak in front of an audience… We had this idea, that once a day everybody should say something (BA).

The use of drama encouraged students to take other persons’ perspectives and helped shy children to participate as “someone else”, thus building self-confidence in oral performances. An extended understanding of texts, is another outcome of the use of drama as described by Wolf (1998), in line also with the principles guiding Swedish experienced-based reading acquisition.

The link between teachers’ extended teaching experiences and teachers’ abilities to adjust to all the
students’ needs deserves attention. Teachers’ large toolboxes, the ability to choose relevant methods and materials, and flexibly arrange the classroom organization facilitated teachers to let literacy activities link to students’ prior knowledge, and in this way, prior experiences were gradually extended to the unknown and more abstract (Cummins, 1996; Gibbons, 2006; Hammond, 2001).

**The “fun factor”**. The word “fun” was a frequently reoccurring word in all interviews:

We just had so much fun. The children even thought that the other teachers and I lived together because we were working in the evenings at her house. But we enjoyed our work so much... And every morning they were there before us, the children were Happy. Always so happy. They really liked coming to school. (Teacher’s narration)

The belief that what can not be achieved today can be achieved tomorrow is reflected by the fact that students carefully chose books almost too hard to read, as they very deliberately strived forward, according to the informants. All informants held the belief that there was no contradiction between the hard work and the fun work. However, work considered being tedious by the teachers, like sounding out on a regular basis, was omitted. Students’ reactions to tasks guided the teachers’ choices of methods and materials.

Voluntary reading, discriminatory of over-achieving classes in the first study, showed no significant differences between over-achievers and the control group in the follow-up study. However, interviews alluded to the “fun factor”. Reading was a valued activity, and many readings took place during lessons. In addition, fiction was assigned as home work, even during vacations, to help students catch up with their native Swedish peers. One interviewee commented: “We felt like we had no time to lose… each child needed to know what to do next or what to work more with before moving on. Forward, forward”.

The students enjoyed this homework and even asked for it, if the teacher would forget to assign homework. Thus the large amount of readings needed to automatize the reading process was provided (Stanovich, 2000; Wigfield, Guthrie, Tonks, & Perencevich, 2004).

The introduction of the first person-perspective in more advanced writing was described as a turning point for both the engagement and the development of writing skills. When a text was read, the children took on the perspective of one of the characters in the story and then wrote a new story employing the first person-perspective. One informant gave the following description:

Then something really happened with their languages. The texts got so fascinating. I believe it had something to do with the students having knowledge about what they were going to write about. The spelling word “they” could take on a double perspectives. The character and I. I believe that this made them feel like real authors. (Teacher’s narration)

Students obviously felt part of the community of readers and writers (Verhoeven & Snow, 2001). One of the interviewees alluded to the ZPD: “And you can’t write the wrong things, because when you use the first person perspective... it can’t get wrong! ”.

Letting the students develop their reading skills within the realms of their own ZPD enabled them to experience the joy of success (Vygotsky, 1978).

**Collaboration.** Collaborative aspects, enhancing both students’ and teachers’ work and learning, protruded as a major feature (Vygotsky, 1978). Linkages between a collaborative classroom climate and high reading achievement were shown by earlier researches (Brophy, 2005; Parker, Hannah, & Topping, 2006; Wigfield et al., 2004), and this aspect was stressed by all informants, although several forms of classroom work were employed. Collaborative teacher work also protruded as a characteristic feature of schools where the students over-achieved in reading (Mosenthal, 2004). Evidently, the cooperation among the librarian, the
preschool teachers, the leisure time assistants and the teachers were prerequisites to enable individualized scaffolding. All collaborators would exceed their professional roles when were needed. Collaboration as a condition for imaginative thinking was also put forward: “Imagination is a key word. If you run out of imagination… then nothing will happen… but you need other people around you”.

This excerpt indicated the awareness among the teachers of the relationship between imaginative thinking and creative teaching.

Collaboration with the parents was the success factor most emphasized by the informants. Statistics revealed shared reading in pre-school was a discriminate distinctive feature of over-achieving classes, though low values were indicated for this measure on classes with the similar language and socio-economic backgrounds in the preceding study.

Interviews revealed that parents were invited from the start to participate in the reading communities as collaborators. At frequently occurring, short, formal parents’ evenings, explicit hands-on information about which fruitful assistance parents could provide were communicated by the teachers. Also, affective qualities in shared reading were emphasised, not only skill-and-drill (Baker, 2003). These meetings were not social events, but provided straight information about the children’s reading progress, current tasks and projects. Tasks were assigned to the parents, also in their mother tongue. One of the informants who were not a teacher explained how her confidence in the teachers was built up:

These teachers… proper… they looked like our traditional teachers, real teachers. They had authority as teachers. It’s something about that. They (the parents) had confidence in the methods these teachers employed… and they had homework every day. From the first day of school. (Informants’ narration)

Reading journals were going back and forth between the school and the home, thus ensuring the children that their attainments were seen, but also strengthening the ties between the home and the school. All informants mentioned the deep mutual trust that developed between the parents and the teachers relations contributing to a positive learning environment for the children (August, 2006; Cummins, 1996; Drummond & Stipek, 2004; Van Horn, 2000).

Avoiding colour blindness. The same explicitness as in the parental communications also characterized the communications and the instructions of the students. The expectations were made clear. Consistency in management techniques made procedures clear:

Every new task we introduced very elaborately. Then we repeated everything exactly, the next day. Every morning we explained what was going to happen during the day. And we explained that we might not have time enough to finish it all. But then we would continue the next day, so that they felt that security… the children always knew what was expected of them. (Teacher’s narration)

Imitational elements were tied to the language acquisition processes, known to enhance the internalization of language structures (Lantolf, 2006; Vygotsky, 1978). How strategies for reading comprehension were implemented was described by one of the interviewees: “Strategies for understanding… Read, retell, summarize and write. Read, retell, summarize and write. This constant summarizing… it results in reading comprehension”.

The repeat of the activities evoked a feeling of security among the students. The learning outcome was knowledge about the text structure, integration skills and comprehension monitoring, all critical skills for reading comprehension (Collins Block, Gambrell, & Pressley, 2002; Cain et al., 2004).
From pre-school and onwards, the librarian and the teacher functioned as role models in giving “Book Talks”, an instructional strategy linked to effective literacy instruction (Collins Block et al., 2002; Gambrell, 1996; Gibbons, 2002). In giving their own “Book Talks”, students earned proficiency as oral presenters, thus opening a gateway to the Swedish academic codes where oral presentations played an important role.

Teachers’ scaffolding also included assistance usually performed by parents in all-Swedish classes, such as instructions on grammar, spelling and vocabulary options, all crucial elements for L2 learners to acquire as effectively as possible (Hammond, 2001; Gibbons, 2002). In the employment of process writing, those needs were taken account of:

Many teachers let their students write freely. So did our children, but we were quite tough in correcting. Because there was no one else to tell them about the conventions concerning sentence building, inflections, vocabulary… So we made them correct the mistakes. And rewrite. And then they had to correct the mistakes. And rewrite (laughter). (Teacher’s narration)

The combination of Bernstein’s (1971) concepts of strong framing and weak classification got a new connotation in these classrooms. The combination of strong framing and weak classification appeared in this context as a culturally sensitive and transitory phase in the students’ educational trajectories. The strong framing, such as elements of direct instruction and explicit communication, satisfied the needs of the students and did not abandon them in a linguistic void (Au & Raphael, 2000; Cummins, 1996; Gibbons, 2002; Kubota, 2004). Simultaneously, weak classification such as cross-curricular connections, thematic work and the use of authentic literature instead of basals, created an interactional and transactional learning space where students were prepared for further Swedish schooling. Hence, language served as a tool in the process of empowerment (Freire, 1998).

**Resisting the deficit syndrome.** Teachers’ trust in their students’ capabilities is reflected in the statistical measures of self-reliance and the avoidance of pull-out strategies. The combination of appropriate scaffolding, teachers’ high demands and high expectations communicated a perspective for the future, thus helping students strive for the upper limit of the ZPD (Vygotsky, 1978). The teacher’s voice represented the view held by the informants: “Children have such capacities. They can handle so much... and if they get proper support. But you have to believe in them”.

The only test aiming at the lower limit of the ZPD the students encountered was the test employed in this study. On other occasions, dynamic assessment procedures were employed to enhance the perspective for the future, leaving the students with their self-confidence intact, in accordance with research promoting such assessment procedures, especially when L2 learning was concerned (Darling-Hammond, 1994; Pavlenko, 2002; Lantolf, 2006). Students’ self-efficacy beliefs were referred to: “Sometimes we were a bit worried the students shouldn’t cope with the tasks we’d given them. ‘Just be cool’, they always said, ‘We’ll manage’. And so they did”.

Trust is also related to the question of responsibility. This relationship is commented on in the following quotation:

As adults we are more experienced, and we have more extended frames of reference, but we do not have priority in interpreting meaning. We the teachers talked a lot about that… So in that respect they were given a lot of responsibility, the children. (Teacher’s narration)

The teachers concentrated on students’ possibilities instead of their weaknesses. Deficits were rather located to the way children were received at school, encouraging improvements of routines and practices, opposite to blaming deficits on the individuals’ lack of abilities. Children were not seen as deficit
communicators, either as a collective or as individuals. The deficit syndrome, as it was described in the literature (Au & Raphael, 2000; Bernard, 2004; Heat, 1983; Kubota, 2004; Pavlenko, 2002; Shohamy, 2004), was certainly defeated both by teachers and students.

**Concluding Remarks**

These teachers resisted the deficit syndrome by avoiding colour blindness in finding their ways to enact pedagogy in culturally sensitive classrooms. To promote reading as participation, inclusion protrudes as a vital characteristic of these classrooms with language learners at all different language levels. The applicability of Vygotskian theory on language acquisition is demonstrated, with regard to both social and individual learning processes, highlighting notions like scaffolding and learning in the ZPD, with important implications for teachers’ pedagogical choices.

The relations between students and teachers are characterized by the resistance to the deficit syndrome. High expectations, sufficient support, and high demands facilitate high achievement levels. The necessity of a further scrutiny of discourses mediating a monolingual perspective is indicated, since the multilingual perspective communicated by the interviewees protrudes as a potent feature of successful instruction. In particular, the rejection of a strong division between the second and first language learners deserving attention, as such a distinction in itself may support a monolingual perspective, underscores the otherness of multilingual children.

However, a multitude of books in the classroom is not enough to promote reading. In this study, emergent academic skills were a synergetic outcome dependent on several factors. Teachers’ flexibility in approaches to reading acquisition is emphasized by their practice of letting students’ individual needs guide the choices of materials and methods. Cross-curricular connections as well as connections across contexts in and out of school contexts created a learning environment where learning could start from the known to be expanded into the unknown.

Although the results of the first study revealed patterns of inequity at a structural level, the addition of qualitative data was needed to shed light upon the teachers’ roles as agents of changes. Nor did resistance to a monolingual discourse emerge as an explanatory factor until the frame of reference was expanded to include critical perspectives either. Therefore, mixed methods and trans-disciplinary approaches are needed to promote research adapted to the transformative needs of a postmodern society where novel phenomena link to old phenomena in new ways.

**References**


A STUDY OF MULTICULTURAL GRADE THREE CLASSES OVERACHIEVING IN READING


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A STUDY OF MULTICULTURAL GRADE THREE CLASSES OVERACHIEVING IN READING


Factors That Affect Psycho-Social Development of Preschool Children in Terms of Art Activities: Family and Teacher of Variables

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People living in a society need socialization. While maintaining social relations, they learn behaviors approved by the society. Through art education, which is applied in preschool education, planned studying habits, taking responsibilities, cooperating, helping, developing solidarity habit and building positive relations with others are taught to the children. However, the environment is an important factor in the psycho-social development of children. In this research, the psycho-social development of six-year-old children that attended preschool in affect of sosyo-cultural level, educational level of parents, the year of attending preschool, sosyo-economic level, gender, number of sibling and the status and graduation program of the teacher, has been investigated. Psycho-social Behaviors Scale for Preschoolers developed by Turkish Psychology Union Preschool Committee (1998) was applied to designate the psycho-social development. The sample is composed of 119 children. Different art activities of children attending preschools were recorded by camera and the psycho-social behaviors were assessed by two observers in four months. The correlation among the scores, which was given by the two observers, was calculated, and the averages of the two observers’ scores were used. Data were tested through the Pearson moments multiplication correlation coefficient, regression analysis. As the result of the research, it was found that parents’ sosyo-cultural level, sosyo-economic level, parents’ education level, number of sibling, the year of attending preschool and status of teachers explained and predicted psycho-social development level six-year-old children that attend preschool.

Keywords: art education, psycho-social development, preschool education

Introduction

People living in a society need socialization. Social relations in cultural conditions affect both the society and the structure of the individuals. Therefore, individuals spend their lives seeking to adapt to environment (Yavuzer, 1998). After birth, in his/her struggle for adapting to physical and social environment, a child gets the biggest support from his/her parents. Parents and the other members’ interaction with a child determine the place of the child in the family. The attitudes towards the child and socialization opportunities provided to the child are of significant importance in this period (Yavuzer, 1994; Eminoğlu, 2007). The pattern of the attitudes
of the child toward society and social lives, and how well she/he get on with others largely depend on the learning experiences in his/her early years. Through their experiences, children gain both positive behaviors like love, cooperation and negative behaviors like aggressiveness. What type of behavior the child has will largely depends on social learning experiences and the models around him/her. The development of social behaviors is generally determined by particular experiences (Morgan, 1991). Therefore, family and the individuals in the family are prominent models for learning social behaviors. The child takes family’s identification models and learns their own way of life through imitation (Yavuzer, 1998).

Children learn many social behaviors from their families and other adults till they come to preschool education institution. Once a child starts school, family members who are important role models are replaced by teachers. In a child’s life, the second most important person and social institution after his/her family are teachers and schools (Artut, 2006). The child learns not only the socially-accepted behaviors at school but also the ways to get into effective communication with adults other than his/her family members and peers (Senemoğlu, 1994). The behaviors of the children at school affect their social behaviors and help them understand themselves better. The attitudes and behaviors of the teacher are important factors in children’s acquisitions of positive social behaviors.

The children in preschool period are in the search of new and need friends who can help them develop their creativeness and artistic process and with whom they can communicate and express themselves and cooperate (Artut, 2006). In early childhood, one of the aims and objectives of visual art instruction is to provide children with opportunity to work together and organize and manage artistic activity they plan as a group and develop children’s self-confidence and independence (Arda, 2009; Nikoltos, 2000). With visual art activities, the children are taught to work in planned way, take over responsibility, work in cooperation and develop positive relations with others, solve problems, share ideas with his/her peers, respect others artistic works and are given opportunities to exhibit these psycho-social behaviors they acquire (Arda, 2009; Abacı, 2003; Aral, Yaşar, & Kandır, 2002; Nikoltsos, 2000; Şahin, 2004; Gel, 1994).

Today in education processes, besides academic skills, it is important for children to develop psycho-social skills—a belief based on the assumption that social development is also a basis (Akkök, 1999). Psycho-social skill is to develop positive relationships with peer groups, family and teachers. More specifically, psycho-social skill can be explained with basic skills as balancing emotions, social skills and positive communication skills. The psycho-social skills of the children can be product of many factors (Brophy-Herb, Lee, Nievar, & Stollak, 2007). Both family and school are important in shaping psycho-social development and explaining it. Therefore, this study sought to determine family and teachers’ characteristics which affect psycho-social development of preschool children and some suggestions about early interventions were proposed.

**Problem**

The aim of this study is to find out whether there is a significant relation between psycho-social development scores of six-year-old children attending preschool education and the socio-cultural environment they live in, socio-economic level, parents’ education level, number of siblings, gender, the length of attendance to preschool education, the length of service of the teacher, or the type of school the teacher graduated from, and whether these factors interpret psycho-social development of children at a significant level.
Methodology

The Research Design

The behaviors of the children in the study group of art activities (paper works, material studies, project studies, paint works and dough activities) were recorded with a secret camera for four months. Observation method is a data collection method by observing people in different environments for various behaviors. Observation is a technique which allows collecting data about all observable behaviors of the individuals one by one or as a group without changing the conditions of the individuals, and as it is suitable for development and socialization features it finds a larger place in preschool education institutions. However, the observation method has some limitations which particularly stem from the observer himself/herself (Kepçeoğlu, 1996). Therefore, two observers scored psycho-social behaviors of the children independently for each activity and each recording to reduce observer-related limitations and collect data objectively. Before data were assessed the correlation coefficient between the scores of the two observers and their coefficient value was found to be $R = 90.204, P < 0.01$. These two values indicate that the relation between the scores the two observers gave is high.

In the assessment of data the mean score the two observers gave was used.

The Subjects

The universe of the study is composed of six-year-old children attending preschool education in Konya, Turkey. The study group of four schools from high socio-cultural environment, four schools from middle socio-cultural environment and four schools from low socio-cultural environment with random clustering method, and 119 children from the same schools were chosen with random element sampling.

Measurement

Psycho-social Behaviors Scale for Preschool Children developed by Turkish Psychology Union Preschool Committee (1998) and forms were used to collect data for the study.

**Psycho-social behaviors scale for preschool children.** The scale is designed in Likert type with five choices. The Alfa coefficient was calculated to be 0.89 for all items of the scale, and it was stated that the inner-consistency of the form was high (Ekinci-Vural, 2006). Higher scores from observation form indicate that the development level of the child in this field is high.

Data Analysis

In statistical analysis of data, Pearson correlation coefficient, simple linear regression analysis and arithmetic mean and standard deviation values were used.

Results and Discussion

In this section, first of all, the Pearson correlation coefficient and regression analysis results related to the factors which can affect psycho-social development of children were given. Later on, arithmetic means and standard deviation values for each factor were given to see these factors are in favor of which group.

In Table 1, the relation between demographic characteristics of six-year-old children attending preschool education, teacher related variables and psycho-social development level scores was examined with Pearson correlation coefficient. There found negative significant relation between socio-cultural environment in which the children live and psycho-social development scores, the number of siblings and psycho-social development
scores. There found negative significant relation between teachers’ length of service and psycho-social development scores. We found: (1) There was positive significant relation between psycho-social development scores and mothers’ education level, father education level, length of preschool education, socio-economic level of family; (2) There was not any significant relation between psycho-social development scores and gender, and the type of school the teacher graduated from.

Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Psycho-social development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-cultural environment</td>
<td>$R = -0.420$ $P = 0.000^{**}$</td>
</tr>
<tr>
<td>Gender</td>
<td>$R = 0.037$ $P = 0.691$</td>
</tr>
<tr>
<td>Mother education level</td>
<td>$R = 0.432$ $P = 0.000^{**}$</td>
</tr>
<tr>
<td>Father education level</td>
<td>$R = 0.341$ $P = 0.000^{**}$</td>
</tr>
<tr>
<td>Number of siblings</td>
<td>$R = -0.264$ $P = 0.004^{**}$</td>
</tr>
<tr>
<td>The length of attendance to preschool education</td>
<td>$R = 0.397$ $P = 0.000^{**}$</td>
</tr>
<tr>
<td>Social-economic level</td>
<td>$R = 0.593$ $P = 0.000^{**}$</td>
</tr>
<tr>
<td>Type of school the teacher graduated from</td>
<td>$R = -0.103$ $P = 0.263$</td>
</tr>
<tr>
<td>The length of service of the teacher</td>
<td>$R = -0.208$ $P = 0.023^{*}$</td>
</tr>
</tbody>
</table>

Notes: $^{*}P < 0.05; ^{**}P < 0.01.$

When Table 2 is examined, results indicate that the socio-cultural environment in which six-year-old children attending preschool education predicts their psycho-social development scores ($R = 0.420, R^2 = 0.176, F = 25.060, P < 0.01$). The socio-cultural environment of children explains 17.6% of total variance in psycho-social development. The gender of six-year-old children attending preschool education does not predict psycho-social development scores ($R = 0.037, R^2 = 0.001, F = 0.159, P > 0.01$). Mothers’ education level of six-year-old children attending preschool education predicts psycho-social development scores ($R = 0.432, R^2 = 0.187, F = 26.897, P < 0.01$), and explains 18.7% of total variance in psycho-social development. Father education level of six-year-old children attending preschool education predicts psycho-social development scores ($R = 0.341, R^2 = 0.116, F = 15.400, P < 0.01$), and explains 11.6% of total variance in psycho-social development. Numbers of siblings of six-year-old children attending preschool education predict psycho-social development scores ($R = 0.264, R^2 = 0.070, F = 8.746, P < 0.01$) and explains 7.0% of total variance in psycho-social development. Length of preschool education of six-year-old children attending preschool education predicts psycho-social development scores ($R = 0.397, R^2 = 0.158, F = 21.908, P < 0.01$), and explains 15.8% of total variance in psycho-social development. Socio-economic level of families of preschool education of six-year-old children attending preschool education predicts psycho-social development scores ($R = 0.593, R^2 = 0.352, F = 63.535, P < 0.01$), and explains 35.2% of total variance in psycho-social development. Type of school the teachers of six-year-old children attending preschool education does not predict psycho-social development scores ($R = 0.103, R^2 = 0.011, F = 1.267, P > 0.01$). Length of service of the teachers of preschool education of six-year-old children attending preschool education predicts psycho-social development scores ($R = 0.208, R^2 = 0.043, F = 5.278, P < 0.05$), and explains 4.3% of total variance in psycho-social development. When t-test results of the regression coefficients’ significance were examined, it was seen that the most significant
predictive one is the family’s socio-economic level ($\beta = 0.593; t = 7.971$), which is followed by mothers’ education level ($\beta = 0.432; t = 5.186$), socio-cultural environment in which children live ($\beta = 0.420; t = 5.006$), the length of preschool education ($\beta = 0.397, t = 4.681$), fathers’ education level ($\beta = 0.341; t = 3.924$), the number of siblings ($\beta = -0.264; t = -2.957$) and the teacher’s length of service ($\beta = -0.208; t = -2.297$). The authors were seen that gender ($\beta = 0.399; t = 0.691$), and the type of school the teacher graduated ($\beta = -0.103; t = -1.125$) do not predict children’s psycho-social development of children.

Table 2

Explanation of Psycho-social Development by Demographic Characteristics of Six-Year-Old Children Attending Preschool and Teacher-Related Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>R</th>
<th>R²</th>
<th>F</th>
<th>B</th>
<th>S. Error</th>
<th>Beta</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-cultural environment</td>
<td>0.420</td>
<td>0.176</td>
<td>25.060</td>
<td>-13.744</td>
<td>2.745</td>
<td>-0.420</td>
<td>5.006</td>
<td>0.000**</td>
</tr>
<tr>
<td>Gender</td>
<td>0.037</td>
<td>0.001</td>
<td>0.159</td>
<td>1.997</td>
<td>5.007</td>
<td>0.037</td>
<td>0.399</td>
<td>0.691</td>
</tr>
<tr>
<td>Mothers’ education level</td>
<td>0.432</td>
<td>0.187</td>
<td>26.897</td>
<td>13.799</td>
<td>2.661</td>
<td>0.432</td>
<td>5.186</td>
<td>0.000**</td>
</tr>
<tr>
<td>Fathers’ education level</td>
<td>0.341</td>
<td>0.116</td>
<td>15.400</td>
<td>11.477</td>
<td>2.925</td>
<td>0.341</td>
<td>3.924</td>
<td>0.000**</td>
</tr>
<tr>
<td>Number of siblings</td>
<td>0.264</td>
<td>0.070</td>
<td>8.746</td>
<td>-8.460</td>
<td>2.861</td>
<td>-0.264</td>
<td>-2.957</td>
<td>0.004**</td>
</tr>
<tr>
<td>Length of attendance to preschool education</td>
<td>0.397</td>
<td>0.158</td>
<td>21.908</td>
<td>8.899</td>
<td>1.901</td>
<td>0.397</td>
<td>4.681</td>
<td>0.000**</td>
</tr>
<tr>
<td>Social-economic level</td>
<td>0.593</td>
<td>0.352</td>
<td>63.535</td>
<td>14.105</td>
<td>1.770</td>
<td>0.593</td>
<td>7.971</td>
<td>0.000**</td>
</tr>
<tr>
<td>Type of school the teacher graduated</td>
<td>0.103</td>
<td>0.011</td>
<td>1.267</td>
<td>-2.676</td>
<td>2.378</td>
<td>-0.103</td>
<td>-1.125</td>
<td>0.263</td>
</tr>
<tr>
<td>Length of service of the teacher</td>
<td>0.208</td>
<td>0.043</td>
<td>5.278</td>
<td>-6.950</td>
<td>3.025</td>
<td>-0.208</td>
<td>-2.297</td>
<td>0.023*</td>
</tr>
</tbody>
</table>

Notes. *P < 0.05; **P < 0.01; R = Correlation; $R^2 = R$ Square; F = One Way Anova Result; B = Unstandardized Coefficients; Beta = Standardized Coefficients; t = t-test for independent groups result; P = significance level.

Table 3

Descriptive Statistics on Six-Year-Old Children’s Psycho-social Development Levels in Terms of Socio-cultural Environment, Mothers’ Education Level, Fathers’ Education Level and Socio-Economic Level Variables

<table>
<thead>
<tr>
<th>Socio-cultural level</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>Sd</th>
<th>Mothers’ education</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>Sd</th>
</tr>
</thead>
<tbody>
<tr>
<td>High cultural level</td>
<td>39</td>
<td>157.769</td>
<td>24.056</td>
<td>Primary school</td>
<td>47</td>
<td>127.936</td>
<td>23.165</td>
</tr>
<tr>
<td>Middle cultural level</td>
<td>41</td>
<td>131.365</td>
<td>21.652</td>
<td>High school</td>
<td>36</td>
<td>138.861</td>
<td>25.918</td>
</tr>
<tr>
<td>Low cultural level</td>
<td>39</td>
<td>130.281</td>
<td>24.991</td>
<td>University</td>
<td>36</td>
<td>155.777</td>
<td>23.595</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Socio-economic level</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>Sd</th>
<th>Fathers’ education</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>Sd</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-750 TL</td>
<td>29</td>
<td>123.379</td>
<td>23.885</td>
<td>Primary school</td>
<td>27</td>
<td>126.888</td>
<td>22.898</td>
</tr>
<tr>
<td>750-1,500 TL</td>
<td>48</td>
<td>132.708</td>
<td>23.788</td>
<td>High school</td>
<td>40</td>
<td>135.750</td>
<td>27.540</td>
</tr>
<tr>
<td>More than 1,500 TL</td>
<td>31</td>
<td>165.645</td>
<td>12.531</td>
<td>University</td>
<td>52</td>
<td>149.307</td>
<td>24.434</td>
</tr>
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</table>

According to Table 3, results indicate that as children’s cultural level, mothers of children education level, father of children education socio-economic level of families of children decrease, their psycho-social development score means decrease as well. Psycho-social behaviors are learned later by taking models. Individuals’ families and the people around the individuals are prominent models for learning psycho-social behaviors. Children do not only learn to help each other, cooperation, but also learn behaviors like crying, hitting and offence (Morgan, 1991; Oğuzkan & Oral, 1990). Moreover, it is highly probable that families in good economic condition and with high education level strengthen social skills of their preschool children by having confident and respectful family strategies (Brophy-Herb et al., 2007). It can be attributed to the fact that parents
with higher level of education take over more responsibilities about children and their development and their being suitable models for psycho-social development as they share more things with their children (Morgan, 1991). Er-Gazeloğlu (2000) and Brophy-Herb et al. (2007) found that as parent education level increase, psycho-social development scores increase, and parent education levels have a negative significant relation with problematic social behaviors and social skills. This can be attributed to the fact that families with high socio-economic levels do not experience financial stress and support the activities in which children can socialize, and spend more time with their children as they do not have socio-economic worries (Morris & Gennetian, 2003). The findings of the study are supported by Öğretir’s (1999), Berger, Paxson, and Waldfogel’s (2005) and Brophy-Herb et al. (2007) that family’s socio-economic level has a significant effect on social behaviors.

There is no difference between psycho-social development mean scores of girls and boys ((girls: $\bar{X} = 138.875; sd = 26.862$); (boys: $\bar{X} = 140.872; sd = 26.445$)). Gizir (2002), Çimen (2000), Eminoğlu (2007), Baran (2005), Brophy-Herb et al. (2007) found that gender does not have significant effect on social development of children.

The psycho-social development scores of the children with no sibling or with one sibling are higher than those of the children with two siblings or more than two siblings: ((no sibling: $\bar{X} = 143.607, sd = 26.791$); (one sibling: $\bar{X} = 145.868, sd = 25.662$); (two sibling: $\bar{X} = 121.409, sd = 19.030$); (more than two siblings: $\bar{X} = 128.750, sd = 23.444$)). Most of the social behaviors are based on family-learning or taking models provided by family members. The fact that children with two or more than two siblings have lower psycho-social development scores can stem from their taking negative behaviors of their siblings as models. Moreover, children’s psycho-social development scores can be significantly affected by the environment they live in. Öğretir (1999) and Çimen (2000) found that the number of siblings affects psycho-social development. However, it contradicts with Eminoğlu’s (2007) finding that the number of siblings is not significant in children’s social development.

Result show that as the length of preschool education children receive increases, their psycho-social development mean scores increase as well ((No previous preschool education: $\bar{X} = 132.845, sd = 26.061$); (attending preschool for one year: $\bar{X} = 134.090, sd = 24.663$); (attending preschool for two year: $\bar{X} = 145.235, sd = 24.445$); (attending preschool for three year: $\bar{X} = 162.2000, sd = 17.772$)). Preschool education institutions bring children together in an educational and healthy environment and help them internalize the cultural values of the society he/she lives in, a child can acquire appropriate behaviors better in this environment. The child can learn accepting himself/herself and others, protecting his/her rights and respect others’ rights, appropriate behaviors by internalizing cultural values, expressing himself/herself independently, establishing his/her own rules which will also be adopted by everyone, helping each other, cooperation, waiting his/her turn, realizing the responsibility he/she takes over and compromising in preschool education environment (Mangur, 1987; Baykan et al., 1994). The findings of the study are supported by Dinç (2002), Eminoğlu (2007), Çimen (2000) and Baran’s (2005) findings that the lengths of attendance to preschool education affect children’s psycho-social development. Teachers graduation status do not affect children’s psycho-social developments ((High school graduation status: $\bar{X} = 165.285, sd = 10.546$); (associate degree: $\bar{X} = 135.101, sd = 29.737$); (bachelor’s degree: $\bar{X} = 139.237, sd = 23.755$)). This result can be attributed to the fact that in children’s psycho-social development family characteristics and the attitudes and behaviors of teachers are more important than teacher graduation status. Teachers’ length of service affects children
psycho-social development ((6-10 years: $X = 147.489, sd = 25.283$); (11-15 years: $X = 133.609, sd = 25.722$); (more than 15 years: $X = 135.000, sd = 27.538$)). This can stem from the fact that younger teachers believe that psycho-social development is as important as academic success and learn how to support their students’ psycho-social developments with art activities in their teacher training periods.

Conclusions and Suggestions

When the research results are assessed, it is seen that family-related factors predict psycho-social development scores. The following suggestions can be made in line with the findings of the study:

1. Preschool education should be compulsory and the society can be supported to start preschool education at an early age;

2. The most disadvantageous group for psycho-social development is the one which has grown up in low socio-cultural environment. Therefore, in making preschool education widespread, the place with such characteristics can be given priority;

3. Considering that peer interaction is important in children’s psycho-social development, social activities to which children in disadvantaged groups who can subscribe free of charge can be organized, and they can be encouraged to participate these activities.

In the study it was found that parent factors are significant in accounting for children’s psycho-social development. Therefore, studies on parent behaviors and children’s psycho-social developments can be carried out to determine which behaviors of parents prevent children’s psycho-social development.

To examine age-related changes in children’s psycho-social development, studies of different age groups from different socio-cultural environments can be conducted.

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FACTORS THAT AFFECT PSYCHO-SOCIAL DEVELOPMENT OF PRESCHOOL CHILDREN


New Explorations With Waste Materials in Early Childhood Education*

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Creativity is innately brought with secret power which can emerge at any time throughout life and be enhanced if fostered. Properly designed art activities serve as a potential for emergence and the enhancement of children’s creativities in their early childhood educations. Those children who cannot express their emotions through oral language or other activities are provided with such an opportunity to express themselves and reflect their thoughts, emotions and views on daily experiences. Art experiences foster creative thinking by stimulating imagination. There are a great variety of techniques to be used in art activities, and a lot of various materials and equipments are available. One of the options for material selection is that of waste materials which help children attain new experiences and ideas. Waste materials include boxes, plastic bottles, pieces of cloth, rolls of paper towels, reels, beads, nutshells, tree shells and leaves with different shapes and sizes. Another advantage of using waste materials is that children learn how to recycle these materials while they gain a sense of texture, shape, weight, wideness and space. Furthermore, this kind of an activity fosters creative thinking and enhances visual and tactual perceptions while the children create unique things. In this study, the status and the importance of the use of waste materials in art activities mentioned in early childhood programs including the points to be born in mind while preparing and using such materials will be discussed and eventually sample products made with waste materials by the children will be presented.

Keywords: early childhood education, art activities, waste materials

Introduction

Creativity was considered as the ability to feel the gaps in problems or information, to develop thoughts and hypotheses, check and improve hypotheses, and put forward new experiences and products within a new

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thought scheme by forming new relationships among connections which have not been made before (San, 1995; Torrance, 1995). In creative process, old experiences and new experiences come together. Even though creativity is an innate characteristic of an individual, research has proven the necessity of a suitable environment and adequacy of the stimulants in this environment to be essential in emergence and development of this characteristic (Sternberg, 2005). Starting from early ages, children begin to organize information in a creative way (Gelman & Gottfried, 2006).

Beetlestone (1998) stated that creativity and art are closely related and children need to own the product to get motivated. Art helps the child to gain an aesthetic perspective, be sensitive toward the environment, and realize oneself, express opinion and thoughts in different ways, improve communication skills, better perceive the world around him/her, and improve creativity. In order to achieve these goals, artistic power, interests, needs and abilities of the child should be discovered since his/her early childhood (Isbell & Raines, 2003; San, 2003; Artut, 2007).

Early childhood is an era when the learning potential and creativity of the child is high and it is also an era when these characteristics are getting shaped (Oktay, 2004). Creativity in early childhood could be improved in various areas. However, art has a special place in these areas. Studies done freely by the child using different materials suitable for his/her developments contribute greatly to his/her emotional and aesthetic developments (Abacı, 2003).

The purpose of the art education to be delivered in early childhood education is to enable the child to gain artistic perspective and aesthetic values, and raise individuals who can think creatively (Kefi, 2002).

According to Mayesky (2006), creative art experiences are one of the most important aspects of early childhood education programs. With these experiences the child finds the opportunity to try out various materials while expressing him/her using different techniques. Lloyd and Howe (2003) stated in their research that studying with open-ended materials (waste materials) encouraged problem solving and creative thinking skills. In addition to being a self-expression tool, one of the dimensions of enjoyable and satisfactory art activities which encourage creativity and all development areas of the child includes working with paint, paper, molding materials and waste materials which are pass time activities.

Painting activities among art activities commonly taking place in early childhood education support the child to express his/her thoughts and emotions, use his/her body in a coordinating way, develop language and concepts, and enable the child to gain the skills to manipulate different tools. Cutting-tearing-pasting-folding-rolling techniques play an important role in the development of skills such as decision making, choosing, reasoning, and finishing what has been started. Besides encouraging the child to relax emotionally, display his/her creativity and imagination with unique products he/she has created, and improve craftwork skills and small muscle motor skills, molding materials enable the child to manipulate, construct and think about spatial relationships with three dimensional materials. In studies with waste materials, the child found the chance to improve his/her creativity, imagination and problem solving skills bringing various materials in different ways (Kandır, Özbey, & Inal, 2010).

Art studies carried out with waste materials help children to learn to make use of materials around them by reusing, and improve concepts like texture, shape, weight and position. With this respect, this study aimed to discuss the place and importance of waste materials, their preparation and points to be considered in their use in art activities which are among pass-time activities in early childhood education programs, and give examples of activities including products created by children using waste materials.
The Place and Importance of Waste Materials

Waste materials could be defined as everything that could be preserved in time without losing its characteristic, everything that is thrown away after use at home or work considering they are now useless, something that is preserved by saving and keeping in another place, and something that is natural, factory-made or hand-made suitable for sanitary conditions (Ozatağan & Baran, 2001; Parlakyıldız & Yildizbaş, 2006; Sert, 2009). Although the restriction of waste materials was out of the question, these materials could be classified as practical everyday objects and natural products (Sert, 2009). Waste materials include materials, such as buttons, empty reels, wool, cloth, ribbon, raffia, plastic bottles and lids, corks, decorative tools, foil, cable, cover paper, cartoon, boxes in different shapes and features (household appliances, tooth paste, detergent, drug, biscuits, etc.), wood, leather and sponge pieces, parcel elastic bands, hairpins, beads, magazines, brochures and old books, waste paper, crusts of nuts, such as hazel nuts, peanut and walnut, peels of orange, tangerine and apple, egg shell, legume, such as lentil, chickpea, corn, wheat, bean and pasta, pine cone, leaves, branches and rust, various seeds, dried flower and plants, pebble, rock pieces, shells of sea animals, feathers of various animals like chicken, turkey and bird, sand and sand types and other various materials that could help the emergence of new ideas (Ozatağan & Baran, 2001; Eliason & Jenkins, 2003; Isbell & Raines, 2003; Mayesky, 2006; S. Buyurgan & U. Buyurgan, 2007; Sert, 2009).

Studying with waste materials is an important part of “active learning” method where the child learns by doing, experiencing and experimenting. Children were encouraged to use waste materials freely in active learning process where they interacted with people, objects and actions, and constructed new understandings (Kandır et al., 2010). Active learning starts when children use their bodies and all senses to explore waste materials. In this process, children choose what to do and which materials to use according to their own preferences. These studies that they start with their own choices make learning more permanent and meaningful. Children who taste the delicacy of creating a unique product grow up as individuals with high self-esteem, who can think independently, come up with different solutions to problems and are conscious of what they can do in the future. Studying with waste materials creates the perfect environment in raising children who can question creativity, express themselves freely, and discuss. In addition to causing children to encounter different experiences, the freedom of children to use materials in different ways plays an important role in developing new concepts along with their imaginations (Sert, 2009). For example, while working on waste materials children see the reusability, in other words, recyclability of these materials, which is important in supporting environment education. Interacting with waste material activates scientific process skills providing a “real experience” to think, and question what, why and how to do, and discusses with others (Hohman & Weikart, 2000).

Children ask questions when they are working with waste materials that arouse innate emotions of research and curiosity and seek answers to these questions. They experiment to solve the problems encountered during this purposeful process (Hohman & Weikart, 2000). Waste materials which help children to construct new things enable them to think in the process by widening the possibilities at their disposals, focus on a theme and relax emotionally, and enhances self-esteem by improving hand-eye coordination (Özatağan & Baran, 2001; Isbell & Raines, 2003).

Features of Waste Material

Waste materials to be used by children in their early childhood period in art activities or other activities should have some features.
These features could be as follows:

**Economy.** Because waste materials are those which have not lost their characteristics after use, they do not require expenditure and are of little tangible value. In this respect, waste materials that could be gathered from any environment present children more meaningful experiences than an expensive toy, and are more interesting than a new and expensive toy car or baby doll. Because shapes are ready, they help save time and enable children to create unique products with a wide range of tryouts. Furthermore, the preparation and presentation of waste materials help parents and teachers save time. The fact that these materials that may mean more than one thing for the child can be stored for a long time and reused again and again adds up to the value of the materials (Yılmaz, 2005; Mayesky, 2006).

**Safety.** The most important feature that a most suitable product for the child should bear is that it doesn’t endanger the health and safety of the child. Being one of the most important features of education and game materials presented to children, safety is also an important feature for waste materials. The fact that the waste materials naturally make cleaning, painting and additions easy, increases the safety of the materials (Mayesky, 2006).

**Durability.** Most of the waste materials can be stored without corruption for a long time. Especially, the preparation and presentation of these products suitable for health conditions will increase durability.

**Appeal.** Most teachers and parents opt to provide children with ready-made games and education materials. The cost of most of these ready-made materials is high. These reasons make it difficult to provide as many materials as to children especially at schools. Although these expensive materials are provided for children, they tend to use their appeal in time. For children, most waste materials at home and school might be more appealing than ready-made expensive toys. While children are working on waste materials they can try out freely without feeling afraid of experimenting and express themselves comfortably without pondering too much on details (Mayesky, 2006).

**Practicality.** There are lots of waste materials around the environment. They could be easily attained from nature (pine cone, stone, sea shell, etc.), food products (egg shell, fruit seeds, pasta, etc.) and everyday items (shampoo bottle or tins, toilet paper roll, etc.) (Oğuzkan, Tezcan, Tür, & Demiral, 1981). Because shapes are ready in waste materials, children can use them practically and experiment freely (Yılmaz, 2005). Moreover, the fact that waste materials could be combined easily encourages children in their creations.

**Multiple uses.** Most waste materials are suitable for multiple uses. Children can convert familiar materials that they collect and think of where and how to use while collecting into something else beyond their original functions. This is both an enjoyable activity for them, and also a contribution to their cognitive development processes (Abaci, 2003). For instance, toilet paper rolls could be turned into a binocular, a wheel, a nose or an ear of a human figure, or legs and arms of a puppet figure when added back to back. Depending on the child’s imagination any parcel box could take several shapes. For example, the child can imagine the box as a boat, plane, space craft or a car by sitting in it. When turned over, the box turns into a table, a garage or a dinosaur’s house (Yalçınkaya, 1993; Ozatağan & Baran, 2001). In addition to making any changes they want on the waste material, children have the chance to use them as the most constructivist materials in coming up with practical solutions as they imagine (Abaci, 2003).

**Recyclability.** Children work with waste materials provided in any way they want using their imaginations. These kinds of studies improve children’s creative thinking skills. At the end of the study, the child would taste success and be happy with the emergence of a new product. While doing this, the child would
recycle by creating a new material out of something useful and valued that was once considered useless (Oğuzkan, Demiral, Tür & Tezcan, 1987). Furthermore, the fact that their friends make use of the same material in different ways enables children to take advantage of similarities and differences, and develop convertible thinking skills (Yıldız & Şener, 2007). Children gain personality traits of productive rather than consumers by collecting, saving waste materials and thinking what, where and how to use. Through the studies with waste materials, children learned to reuse, thus recycling these materials rather than throwing away the wastes into the environment. Recycle attained by waste materials makes it easy for the children to gain concepts related to environment and increases sensitivity towards it. It helps children foster positive interaction with the environment by creating life-long preservation sensation. It enables children to use exhausting resources economically, save waste, and learn to be respectful for natural habitats of plants and animals (Eliason & Jenkins, 2003; Jackman, 2005).

The Preparation and Presentation of Waste Materials for Children

Starting from the beginning of the education year, children and parents should be guided about collection of wasted materials and suitable environment should be prepared, because having a variety and sufficient supply in waste materials is difficult. Environment could be prepared by creating material boxes in a suitable corner in the classroom during saving (Yılmaz, 2005).

Waste materials should be presented to children after processing and making them ready for use considering their age, development levels, interests and needs, health and safety conditions because saved waste materials might not be clean and safe for children or in unsuitable shapes for their level. Some waste materials might need to be cleaned, broken into pieces or painted for aesthetical appearance or health conditions. For instance, chemical substance including boxes, such as shampoo or detergent boxes should be presented to children after careful cleaning and ventilating. Sharp and cutting edges of wooden waste materials should be ground not to hurt children and be varnished with odorless materials. On materials to be used painted, natural paints like fabric dyes that will not harm the child should be used or they should be covered with washable cloth. If cloth is to be used in covering, it should definitely be stitched. During pasting rather than chemical substance including adhesives in the market that are harmful for health, harmless wood glue should be used. The lids of bottles and boxes should be closed tightly. Materials with small particles that pose choking dangers (beads, stones and seed, etc.) should be presented under adults’ supervision. Waste materials should be categorized considering their types, dimensions, textures, colors, shapes and substances after cleaning for children’s use. Categorized waste materials should be kept cupboards with open shells or baskets which children can access easily. Categorizing and shelving with children’s helps assists them in encouraging concept development and cognitive process skills. Organizing and making children organize materials give children order and control consciousness. Besides developing social skills, such as taking responsibility, carrying out this responsibility and helping each other, amusement felt with collaborative work help children relax emotionally. Orderly put materials, organized shelves and boxes make it easy to find everything easily and tidy up again after use (Oğuzkan et al., 1992; Yaşar & Aral, 2008; Sert, 2009).

While preparing the environment for waste materials, equal importance should be attached to the aesthetical presentation of the materials as the suitability of the environment. The environment should be wide enough for children to interact with materials with different dimensions safely and comfortably and design new
products. Children especially in their early childhoods prefer to work with big sized materials in art activities taking place in their spare time activity zones. Waste materials are items suitable for big size studies. These kinds of studies are valuable for children in terms of presenting social experiences, such as collaboration, helping each other and sharing (Yıldız & Şener, 2007).

The closeness of waste material study environment to the window will enable children to pay attention to items in their surroundings and be inspired by the environment in their products. For this reason, the fact that the study area is in a light and silent part of the classroom will help children concentrate more comfortably on their studies. The place and walls of the study environment should be covered with easily cleaned materials (Eliason & Jenkins, 2003; Isbell & Raines, 2003; Mayesky, 2006; Can-Yasar & Aral, 2008).

Before starting to practice with waste material, possibilities of materials at hand should be discussed with children. Children should be encouraged to put forward which materials and what part of these materials they can make use of in expressing themselves with the alternatives. Therefore, children are guided to think. It is expected from children to be researchers and designers in their studies with waste materials. It was aimed to develop creative thinking skills of the child, and turn these thoughts into designs with different materials (S. Buyurgan & U. Buyurgan, 2007). Stories, rhymes and songs suitable to the theme to motivate children could be found with them. Music suitable to the rhythm of the emotion during the practice could be made use of. In this way, practice could be started after drawing children’s attentions to the study. In the meantime, the aim was to assist children to put forward their product by activating basic cognitive processes (Ozatağan & Baran, 2001).

One of the most important points to be considered in practice is not to present a wide range of waste materials to the children, which could cause stimulant confusion in them. The presentation of certain number of categorized waste materials helps children to choose more comfortably, simplify decision making about what to create, thus, design unique products. Children should be left free in choosing other materials than those presented to them (Yıldız & Şener, 2007).

Children should be spoken to about the products they make after working on waste materials, be made to share their products with their friends and their products should be displayed in a certain area. Children’s products should never be compared to any other child’s products. Even though each child seems to be doing the same thing, they work according to their own perspectives and perceptions. Children’s studies were unique, valuable and a part of their personalities. Making use of products created as a result of the study process carries high importance for reasons, such as increasing self-respect, sharing of ideas and thoughts about the products and showing the value given to studies with waste products in the classroom. Therefore, children’s products should be valued, and attention and praise should be paid immediately (Darca, 1993; Mayesky, 2006; Can-Yasar & Aral, 2008).

**Sample Activities to Be Implemented With Waste Materials**

Activities to be done with waste materials, study themes and environments are limitless, because with these materials, any kind of products could be studied. As a sample in the scope of the project with dinosaur theme done by children:

(1) Bases that will enable dinosaur models to stand could be made from cardboard boxes from household appliances, such as fridges, washing machines and be presented to children. Decoration environment could be prepared by putting waste materials, such as strings, wools, stones, egg shells, wood crusts, and cloth and leather pieces, dried fruit peels for the children to decorate dinosaur moulds according to their preferences.
Kinds of size used dishwashing gloves could be filled with wool, paper and sponge and be left in the environment. Children can make dinosaur’s feet out of them or use them as something completely different. Besides, children can form a dinosaur family with different sizes and features;

(2) One side of big size boxes could be opened and children can use them as dinosaur houses. They can design living areas for the dinosaur family from waste materials such as tree crusts and leaves, stones and rock pieces of different size of cartoon boxes;

(3) Big size plastic bags could be filled with paper and sponge to swell them so that a big ball is formed. Children could cover these balls with plaster and paint them to look like dinosaur eggs.

**Conclusions and Suggestions**

The use of visually rich waste materials that enrich children’s activities has an important place especially in early childhood education institutions. Waste materials spared for their use give the children a sense of love, trust and value. The child’s free choice of materials presented to him/her, his/her own decision making about how to use them improve self-esteem and the skill of reaching a conclusion. Studies done with waste materials bring along collaboration, respect, different perspectives, pride and happiness of forming and discovering something cooperatively. They teach the child to use the time efficiently by enabling emotional relaxation. Teachers and parents have important responsibilities in preparation and presentation of waste materials that support all development areas of children and in making use of children’s products. With this respect, the following suggestions could be made for teachers and parents:

(1) Teachers primarily should be correct models in saving and recycling the waste materials and should believe in the value of waste materials in encouraging the child’s development areas;

(2) Families could do art studies by saving waste materials together which children can make use of. They can bring these materials to school;

(3) Teachers could make waste material boxes in classrooms to save waste materials children and parents bring from home. They can rearrange these items with children;

(4) Teachers could make plans to make use of waste materials in game, drama, music, language, science-nature, math and early literacy activities apart from art activities done in free time in early childhood education programs.

**References**


NEW EXPLORATIONS WITH WASTE MATERIALS IN EARLY CHILDHOOD EDUCATION

Changes in Lithuanian Pre-school and Pre-primary Education
Quality Over the Last Decade

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Over the last decade, the changes in Lithuanian pre-school and pre-primary education have been predetermined by changes in paradigms of children’s education and strategic education documents that provided for guidelines of high quality children’s (self-)education, an increasing attention of society to the quality of children’s education, training and professional development of educators oriented to the development of professional competences and other factors. The article aims to identify the changes in pre-school and pre-primary children’s education, i.e., to reveal changes observed by service providers: educators, and service receivers: parents.

Keywords: pre-school and pre-primary education, quality indicators, changes in quality of education

Introduction

Over the last decade, one of the priority trends for Lithuanian pre-school and pre-primary education development has been striving for the quality of children’s education (The conception of formal education quality assurance, 2008). The strategic documents provide for a necessity to identify and agree on quality indicators since the conception of education quality is contextual and changing. Lambert and Capizzano (2005) emphasized that the definition of quality of children’s education is defined differently from the point of view of parents, educators and researchers.

Following the analysis of the education scientists’ works, the system of quality criteria of the pre-school and pre-primary education may be established.


High quality of children’s education results in satisfaction of their educational needs, care, corresponds to individual style of experience accumulation and possibilities for (self-)education (Mantle, 2001; Dodge, Colker, & Heroman, 2002; Sylva, Siraj, & Taggart, 2006).

Implementing the content of various education opportunities for (self-)education are created: a possibility for a well-rounded self-education, a possibility for a child to initiate own activities or choose the activities, places, time, activity partners; to develop and get educated in the most appropriate way, through own experience; to act in a resourceful “micro” and “macro” environment; to develop according to the individual programme,
High quality of children’s education is ensured by a two-direction positive democratic interaction between an educator and a child, i.e., a dialogue between a learner and an educator, which is based on personal respect, acknowledgement of child’s uniqueness, key values and positive emotions. A child expresses own wishes, chooses, consults, acts alone or in cooperation, asks for assistance, solves problems, etc. An educator observes, stimulates, supports, acts together, mediates, provides information, creates favourable environment, organises daily life, purposefully enriches child’s experience, applies positive strategies of child’ behaviour management and reflects on interaction with a child (Are preschool program standards enough to ensure quality?, 2008; Monkevičienė, Glebuvienė, & Tarasonienė, 2006).

The quality of (self-)education process is conditioned by the harmony between self-education, creation of learning/teaching situations and objective, planned and organised children education. The content of (self-)education is adopted during children’s play, acting independently as well as getting involved into activity suggested by educators and organising education in a well-thought and purposive way. Constant feedback is provided during children’s activities, and the processes of (self-)education is reflected on (Teaching methods at preschools, 2009; Iowa early learning standards, 2006; Monkevičienė, 2005, p. 188).

The quality of (self-)education process is guaranteed when “appropriate agenda” (daily routine plan) for child’s (self-)education (daily, weekly, annual) is devised, “dynamic and appropriately structured environment”, which is favourable for implementation of (self-)education is created and “(self-)education means and material” are purposefully selected (Dodge & Colker, 1992).

The quality of (self-)education process is conditioned by its openness to parents, social partners and community. Efficiency of children’s (self-)education is pre-determined by teamwork of educators, other specialists working in an institution and social partners (Blandford & Knowles, 2009, p. 42).

Changes in the quality of pre-school and pre-primary education over the last decade have been conditioned by a big number of factors.

The first factor is: a change in paradigms of children education. In the last ten years, there has been a radical shift from teacher-oriented to child-oriented education. According to Bitinas (2000), Bruzgelevičienė (2008) and other theoreticians, the change in Lithuanian education occurred through the transfer from classical normative paradigm to free education paradigm. Defining the paradigms of classical and free education theoretically, Bitinas (2000) pointed to their link with the human nature as one of the main differences between these two paradigms: in the context of classical paradigm, the children’s nature is operated upon, i.e., an educator decides what, how much and how to teach, the process of education is centralised, autocratic; while in the paradigm of free education, there is a cooperation with children’s nature, i.e., an educator makes an attempt to create as favourable democratic conditions as possible for the development of learners’ inner powers, their self-expression and self-development aiming at education of a free creative personality. Thus, there is a transition from educator-centred teaching to a learner-centred (self-)education. The following international projects contributed to implementation of the aforesaid ideas in Lithuania: “Egmont’s Project Method” focusing on application of the project method for achievement of quality of education (Artyn vaiko. 1.2., 1998); “Healthy kindergarten”, which emphasises the importance of systemic change of an institution ensuring children’s safety and health (Bulotaite & Gudzinskienė, 2003); “Head start”, which focuses on the importance of education centred on children’s needs and involvement of family into the process of education (Coughlin, Hansen, Heller, Kaufmann, Stolberg, & Walch, 1997); “Zippy’s friends”, which offers strategies and
techniques for coping with children’s daily difficulties (Zippy’s friends, 2001) and others.

Pre-school education and pre-primary education in this country are in the transitional phase from the paradigm of interaction to the learning paradigm, i.e., they have features of these two paradigms.

The second factor comprises strategic education documents, which provide for guidelines of quality (self-)education of children. According to Article 7 of The Law on Education of the Republic of Lithuania (2003), the goal of pre-school education is to assist children in satisfying their natural, cultural as well as ethnic, social and cognitive needs. According to the Order of the Minister of Education and Science No. ISAK-627 of April 18, 2005, “On the Descriptor of Criteria for Pre-school Education Programmes”, pre-school education providers assume responsibility for the quality of children education, i.e., formation of pre-school education content is decentralised. On the other hand, the published “Metodinės rekomendacijos ikimokyklinio ugdymo programai rengti” (Methodological recommendations for development of pre-school education programme) (2006) contains fields of ideas for creation of high quality (self-)education programmes. The programmes created by education institutions have been implemented in Lithuania since 2007.

Responsibility for pre-primary education is assumed by the state (the prepared national “Bendroji priešmokyklinio ugdymo ir ugdymosi programa” (General Programme of Pre-primary Education and Self-education) focuses on the development of children’s competences) and by education institutions (pre-primary (self-)education content is concretised and implemented in institutions). The national pre-primary (self-)education programme has been realised in education institutions since 2003.

The third factor is a constantly increasing attention of the society to the quality of children’s education. Strategic documents underline an increasing role of parents’/caretakers’ involvement in pre-school and pre-primary education. For example, “The Law on Education of the Republic” (2003) stated parents’ rights to participate in children’s education, “Ikimokyklinio ugdymo mokyklų vidaus audito metodika” (Methodology of Internal Audit of Pre-school Education) (2005) emphasised high quality collaboration between education institutions and parents, etc., “Metodinės rekomendacijos ikimokyklinio ugdymo programai rengti” (Methodological Recommendations for Development of Pre-school Education Programme) (2006) and “Bendroji priešmokyklinio ugdymo ir ugdymosi programa” (General Programme of Pre-primary Education and Self-education) (2003) highlighted parents’ involvement into development and improvement of education programmes as well as into the process of children’s (self-)education, assessment of their achievements and evaluation of education quality.

The fourth factor includes educators’ training, which is oriented to educators’ competence and professional development. As it is pointed out in the strategic principles of “Lietuvos švietimo plėtotės strategija 2003-2012 m” (National Education Strategy for the Years 2003-2012), the role of an educator is considerably changing in the modern knowledge society. An educator, a former source of knowledge and its conveyer, is replaced by an educator—a learning assistant, organiser, moderator and partner. Moreover, educational scientists discuss the educators’ competences needed to perform the newly assigned roles. The programmes, oriented to educators’ competence development are being created (Monkevičienė et al., 2006).

Other factors also conditioned pre-school and pre-primary education; however, the above-mentioned ones are the most vivid.

Since a number of factors have had an effect on the quality of pre-school and pre-primary education, it is necessary to identify how the quality of pre-school and pre-primary education is understood and what changes in children’s education are noticed by its providers (educators) and clients (parents).
The Aim of the Research

The aim of the research is to clarify educators’ and parents’ opinion regarding the quality and its changes in Lithuanian pre-school and pre-primary education that have occurred in the last decade.

The Research Methods and the Sample

The following qualitative research methods were applied: focus groups method (four groups: 26 educators; 44 parents/caregivers) and a deep, semi-structural interview (25 educator). The educators and parents were purposefully chosen from the same education institutions. The research in the opinions of educators and parents was conducted in pre-school institutions of four different Lithuanian regions: in a small state institution in the country, a state institution in town, in a private education institution and in a pre-primary group. The institutions providing pre-school and pre-primary education services and representing different education models as well as possessing different experience in education were selected for the quality research.

Quantitative research methods were also applied: educators’ opinion survey via Internet (501 respondents) and contact survey of parents whose children attended pre-school and pre-primary education groups (463 respondents). The representative probability sampling was used.

The Research Results

Opinions of Educators and Parents About the Features of Quality Pre-school and Pre-primary Education (Quantitative Research)

An attempt was made to identify if parents whose children attend pre-school and pre-primary education groups, and educators who work in these groups and share the same attitude to the quality of education.

The data of quantitative research (see Table 1) reveal a considerable difference in the attitudes of parents and educators: parents relate the quality of education to good care of children, whereas educators emphasise children’s education.

Table 1
Distribution of the Opinion of Parents Whose Children Attend Pre-school and Pre-primary Education Groups, and Educators Working in These Groups About the Quality of Education

<table>
<thead>
<tr>
<th>Statements defining the quality pre-school and pre-primary education</th>
<th>Opinion of parents whose children attend/attended different groups</th>
<th>Opinion of educators working in different groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-school education (%)</td>
<td>Pre-primary education (%)</td>
</tr>
<tr>
<td>Good care for children</td>
<td>66.40</td>
<td>65.40</td>
</tr>
<tr>
<td>Children’s well-being</td>
<td>57.80</td>
<td>59.50</td>
</tr>
<tr>
<td>Loving, kind and attentive educator</td>
<td>51.20</td>
<td>48.80</td>
</tr>
<tr>
<td>High achievements of children</td>
<td>30.60</td>
<td>32.20</td>
</tr>
<tr>
<td>Well-established environment of education institution</td>
<td>25.60</td>
<td>27.30</td>
</tr>
<tr>
<td>Interesting and various life of children in groups</td>
<td>23.70</td>
<td>21.50</td>
</tr>
<tr>
<td>Friendly relationship between kindergarten staff and parents</td>
<td>22.70</td>
<td>22.40</td>
</tr>
<tr>
<td>An place for each child in the kindergarten guaranteed by the state</td>
<td>8.30</td>
<td>7.80</td>
</tr>
<tr>
<td>Professional work with gifted and special need children</td>
<td>7.60</td>
<td>8.30</td>
</tr>
</tbody>
</table>

Parents want their child to not be hungry, to sleep well, to feel well and to be taken care by a loving, kind
and responsible educator (from 48.80% to 65.40% of parents). From 30.60% to 32.20% of the parents in the survey link the quality of education with children’s achievements and only from 21.50% to 23.70% of them relate it with an interesting and varied life of their child in a group. It can be stated that parents insufficiently perceive the functions of institutional education and the effect of quality education on their children. Such parents’ attitude may be conditioned by an insufficient volume of educative activity implemented by education institutions. The opinion of parents whose children attend pre-school groups and pre-primary groups, regarding the quality of education does not differ substantially. Statistically, significant difference in attitudes has not been established.

The educators (74.37%–78.17% of the respondents), similar to parents, think that good well-being of a child is a feature of quality education. However, they also emphasise other quality features related to children’s education: an interesting and varied life of children in groups (from 68.59% to 76.06% of the respondents); a well-established environment of education institution (from 66.90% to 70.40% of the educators); high achievements of children (from 50.90% to 60.56% of the respondents).

Moreover, pre-school educators prioritise education environment and a kind communication of an educator with children, whereas pre-primary educators see resourceful education environment, high achievements of children and education of gifted and special need children as more important factors contributing to the quality of children education. The differences are statistically significant ($p < 0.005$).

According to the data of the quantitative research, there is no clear agreement among professional educators and society on the accepted definition of a quality education. Parents do not know what kind of education to expect; therefore, their expectations are limited only to a proper care about their children. The conception regarding the quality education among professional educators working with children of different ages has not been finally defined yet.

**Changes in the Quality of Pre-school and Pre-primary Education Over the Last Decade: Opinion of Educators and Parents (Qualitative Research)**

The results of the qualitative research are presented in Table 2. Sub-categories and categories were distinguished during the content analysis of texts; the number of statements substantiated the sub-categories and their valency was established.

According to the opinion of educational scientists and education strategists, the quality of pre-school and pre-primary (self-)education have been mainly affected by the philosophy of modern free humanistic (child-centred) education. However, the analysis of educators and parents opinion shows that pre-school and pre-primary education is only partially based on this philosophy.

Parents observe features of free humanistic paradigm of children education in pre-school and pre-primary education institutions. According to them, a child is approached as a personality in education institutions: “They communicate with a child saying: you are a personality, you are a human being, etc. They talk to a child” and “A child is able to feel that he/she is also very important”. Ten statements regarding this issue were provided by parents and the valency of all of them was positive. Pre-school and pre-primary educators did not emphasise this principle. Pre-primary educators did not provide any statements, whereas pre-school educators pointed out only a small number of them, one being of particularly negative valency. The educators stated that a particular focus on children’s rights hinders maturity of their personalities: “The attitude to a child has changed: his/her rights without duties are underlined”. Thus, educators do not highlight this attitude to children as
Table 2

Changes in Quality of Pre-school and Pre-primary Education in 2001-2010 (According to Educators and Parents)

<table>
<thead>
<tr>
<th>No.</th>
<th>Category</th>
<th>Subcategory</th>
<th>Educators number of supported statements. Valency of subcategory: + positive; − negative</th>
<th>Parents number of supported statements. Valency of subcategory: + positive; − negative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pre-school education Pre-primary education Pre-school and pre-primary education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Gradually better-defined features of humanistic children’s education paradigm</td>
<td>Each child is seen as a personality in an education institution</td>
<td>2+; 1−</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>An increasing attention to children and their individuality; children are free to express own opinions and choose activities</td>
<td>9+; 7−</td>
<td>9+; 1−</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Striving for children’s well-being, safety, positive relations with educators and group children</td>
<td>4+; 1−</td>
<td>3+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Striving for children’s successful start of learning at school</td>
<td>0</td>
<td>2+</td>
</tr>
<tr>
<td>2.</td>
<td>Improving satisfaction of children’s needs and development of their competences</td>
<td>Improving satisfaction of children’s needs</td>
<td>8+</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Self-)development of children’s competences</td>
<td>8+; 2−</td>
<td>11+; 2−</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Process of education that ensures satisfaction of children’s needs and development of their competences</td>
<td>4+; 3−</td>
<td>5+; 4−</td>
</tr>
<tr>
<td>3.</td>
<td>Increasing openness of pre-school and pre-primary education to community</td>
<td>More considerable attention of parents and society to children’s (self-)education</td>
<td>4+; 15−</td>
<td>3+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improvement in collaboration with parents</td>
<td>11+; 5−</td>
<td>1+; 1−</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Expansion of social partnership</td>
<td>11+</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Better relations of pre-primary education groups and school</td>
<td>0</td>
<td>11+; 2−</td>
</tr>
<tr>
<td>4.</td>
<td>Improving educators’ competence</td>
<td>Educators’ vocation and personality</td>
<td>3+</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>New roles performed by educators</td>
<td>14+</td>
<td>13+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High qualification, competence</td>
<td>5+; 4−</td>
<td>7+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Increasing educators’ flexibility, informality and openness to innovations</td>
<td>9+; 1−</td>
<td>2+; 1+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improving experiential learning of educators</td>
<td>0</td>
<td>5+</td>
</tr>
</tbody>
</table>

Another feature of free humanistic paradigm of children education in pre-school and pre-primary education institutions is an increasing attention to children and their personalities, empowerment of children to become active subject of self-education, to be able to freely express own opinions, to choose and act. Parents see that educators have become more attentive to a child and take into account their individuality, children have become freer, and are encouraged to express their opinion regarding all the issues related with their life in an education institution: “A considerably increasing attention is paid to a child himself/herself, he/she is approached, asked, educators talk to him/her and discuss with him/her. However, situations when children are disciplined, autocratic decisions are made and children are forced to take afternoon naps still occur in education institutions”. Parents said, “Discipline slightly grips their mind. In this way, they are here accustomed... to lessons”. “My pre-primary child… never has an afternoon nap at home… He does not want to go to kindergarten just because he has to take a nap”. Thus, a child does not feel a full-fledged subject of (self-)education.

The opinion of the educators in the research is varied and not unanimous: out 15% statements, nine are of...
positive and seven are of negative valency; positive statements prevail only in the responses of pre-primary educators. The same tendencies were also revealed by the quantitative research. About 11%-14% of educators aim at children’s discipline and obedience, their calm activities, i.e., they guide themselves by autocratic principles and this is a feature of low-quality (self-)education organisation. It was established that the discipline is prioritised by educators of lower qualification \( (p < 0.05) \). However, there are educators, who offer agenda which does not ensure high quality education of children. They work according to the fixed plan, which does not change (13%-14%) or without any agenda (2%-4%). Not changing and fixed daily routine plan is more frequently practiced among elderly educators \( (p < 0.05) \), whereas educators working in groups with a small number of children usually do not apply any guidelines \( (p < 0.05) \). Thus, a child does not feel as a full-fledged subject of (self-)education.

Introducing principles of humanism and democracy into pre-school and pre-primary education, an attempt is made to ensure children’s well-being, safety, positive relations with educators and children in the group. This feature of education is of particular importance to parents: 26 statements were received regarding this issue. The majority of them are positive; however, as many as six are of negative valency. The parents in the research state that their children feel good and safe in education institutions, they feel love and care of educators and learn skills of nice communication with each other: “When you take your child to that kindergarten and get him/her back happily, I think, it is self-explanatory and you do not need to ask”, “I see that the majority of educators are good and nice” and “Daily consistent work according to systematic programmes liberates children and they eagerly communicate with people”. On the other hand, parents notice that in some education institutions children are sad and bored, they lack interesting activities: “There are kindergartens where children are ‘shepherded’ and there are ones where children are educated. I had a feeling that they were shepherded there: I used to come there and see children play cards with pictures and when I used to come in the evening, children used to do the same”. Pre-school and pre-primary educators expressed a positive opinion regarding children’s well-being in education institutions. It may be concluded that education institutions do not ensure children’s well-being; however, educators are not attentive enough to a child and fail to penetrate into problems of this important aspect of education.

Strategic education documents underline satisfaction of children’s needs and development of their competences. Parents and educators pointed out eight statements showing that children’s needs are satisfied in education institutions. According to parents, children’s needs of nutrition, sleep, safety as well as common and specific education needs are properly met: “When you take a child there for the whole day, you can be calm and sure that he/she will be taken proper care of and not hungry, will have what to do and everything will be ok with him/her”. Educators emphasise that children’s wishes, their interests and individual education needs are considered: “You have to pay more attention to each child, to learn more about him/her, to penetrate into his growth, to notice his/her strengths and problematic areas, to take into account his/her proposals and identify his/her interests”. Negative valency is characteristic of only two statements. Parents notice that children feel unsafe when educators change and the daily routine plan is not adapted to children’s needs: “Educators changed. One stayed and the other came from a different group and I cannot say that at this moment, unwillingness to go to kindergarten started, but the enthusiasm to go there decreased dramatically”. It can be stated that children’s need are met in education institutions.

Educators and parents, in particular, pointed out a big number of statements which emphasise development of child’s competences. Nineteen educators and 36 parents positively evaluate this area of children education:
statements of positive valency prevail. Parents stress that children’s education is well-rounded and that they acquire and develop health, social, communicative, artistic and cognitive competences. Pre-school educators also emphasise development of all the competences, whereas pre-primary educators are more concentrated on the development of competences that ensure more successful learning at school: “In a pre-primary group, a goal is set to empower a child with all the key competences needed for learning at school”. The statements of only four educators and ten parents are negative. Pre-school educators point out that they fail to achieve the appropriate level of competence quality, whereas pre-primary educators refer to insufficient development of children’s social competence, i.e., poor solving of children’s behavioural problems: “... educational and behavioural problems of some children cannot be solved and additional support is needed here”. Parents lack development of children’s abilities most: “Apparently, according to certain qualities of a child or his/her needs, as many circles could be organised as needed to develop their certain abilities”. It can be concluded that children’s competences are developed in a qualitative way; however, not all the expectations of parents are met so far.

The process of education that ensures satisfaction of children’s needs and (self-)development of their competences is seen as the most problematic by educators and parents. Educators give the same number of positive and negative statements. According to educators, education is more objective-based and systematic, modern methods of children’s competence development are applied: “A child brings certain abilities and knowledge at birth. You notice it, record and see what he/she needs. It is extremely important to improve content of education and methods of its implementation to achieve what a child needs”. However, educators lack competences to develop certain abilities of children: “... the problem of gifted children’s education remains unsolved. We lack time, possibilities and sometimes elementary knowledge”. The qualitative opinion survey of educators revealed slightly different tendencies: 18-20 percent of educators not always orient to the development of child’s competences and prioritise conveyance of the planned knowledge. Almost all the statements of parents contain negative valency. Parents agree that competence development is carried out purposefully in an institution; however, conditions for development of children’s abilities are not created: “It would be nice if ‘after-class’ activities could be organised: singing, dancing, etc., because there is an obvious demand for that”.

An increasing openness of pre-school and pre-primary education to the community is a precondition to satisfy parents’ need, to increase their involvement in children’s education and to meet community’s challenges for children’s education. Negative valency statements regarding parents’ and society’s attention to (self-)development of children prevail. Educators state that parents lack pedagogical education, they are passive and do not tend to get interested in children’s (self-)education and involve in this process: “Lately I have noticed one problem: parents’ self-education… Parents express such weird expectations and desires that you start to think is it you, who has to change or is that parents’ attitude that needs changing”. However, they also state that parents have become freer and are particularly interested in pre-primary (self-)education and they see it as important: “There occurs more informal nature in communication with parents, we communicate more and are able to make jokes already”. Parents point to a negative attitude of the society to (self-)education of young children and educator’s profession is unfavourable: “Society’s opinion is unfavourable as well as that of mass media, which moulds such opinion”.

Collaboration of education institution with parents only partially satisfies educators and parents. Educators positively evaluate collaboration with parents: “Parents already understand how they can contribute to child’s life in kindergarten”; however, they also point to inadequate needs or requirements of parents: “... parents think that their children may become genius and are extremely gifted. But reality shows different things”. Parents
positively evaluate educators’ communication with them, their support and consultations, but they would like to receive more information about children’s achievements and communicate more informally or via Internet: “Some parents ask for communication via e-mail”. The same tendencies were confirmed by the quantitative research. Educators insufficiently consider cultural, national and material employment and family situation of children’s family (only 20%-26% educators), children’s bilingualism (12%-15% educators), gender differences between boys and girls (8%-14% educators). Family situation was more frequently taken into account by senior educators ($p < 0.01$) and educators of higher qualification ($p < 0.005$).

Pre-school educators emphasise expansive social partnership. According to educators, communities of institutions have rallied, communication among institutions has become more intensive and many of them have found social partners: “Thinking of ways how to improve children’s education, we’ve come to conclusions that such conditions have to be established for the whole community of the institution” and “... we’ve found more social partners and have established more contacts. Our gain is a collaboration among institutions”. Educators provided 11 statements of positive valency. Pre-primary educators positively evaluated relations between pre-primary education groups and schools: “We cooperate with the school near us” and “Teachers are very happy when they get the portfolio of children’s achievements. They do not need much time to learn a child”.

For evaluating educators’ qualification and competence that ensure the quality of pre-school and pre-primary education, the valency of statements was positive. Parents emphasised educators’ vocation, their personal qualities favourable for children’s education as well as educators’ qualification and competences. The educators themselves mentioned new roles (those of observer, helper, creator of educational environment, etc.), an increasing degree of own liberation and informality, openness to innovations and experiential learning. Thus, parents are confident with educators’ competences, and educators themselves give their positive evaluation as well.

Striving for identification of the influence of pre-school education programmes created by education institutions and the national pre-primary education programme on the quality of children’s (self-)education, a representative survey of educators was carried out and its results are presented in Table 3.

Table 3
Key Changes Working According to Pre-school Education Programme Prepared by Institutions and the National Pre-primary Education Programme (Number of Educators, Percentage)

<table>
<thead>
<tr>
<th>Key changes working according to pre-school education programme prepared by institutions and national pre-primary education programme</th>
<th>Pre-school group (%)</th>
<th>Pre-primary group (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education is more adapted to children’s needs, developmental possibilities and learning styles</td>
<td>65.34</td>
<td>70.71</td>
</tr>
<tr>
<td>Development on the programme allowed for penetration into a modern approach to children’s education</td>
<td>50.90</td>
<td>55.00</td>
</tr>
<tr>
<td>Children’s (self-)education has gained more diversity and variety</td>
<td>45.85</td>
<td>53.57</td>
</tr>
<tr>
<td>Appearance of new, more varied and more innovative forms and techniques of education organisation</td>
<td>42.96</td>
<td>57.14</td>
</tr>
<tr>
<td>Parents’ needs and expectations are better met</td>
<td>30.69</td>
<td>39.29</td>
</tr>
<tr>
<td>Patents are more actively involved in the process of (self-)education in an institution</td>
<td>27.44</td>
<td>32.14</td>
</tr>
<tr>
<td>Quality of children’s life in groups has increased</td>
<td>26.35</td>
<td>29.29</td>
</tr>
<tr>
<td>Enlivenment has been changed for implementing the content of education</td>
<td>21.66</td>
<td>36.43</td>
</tr>
<tr>
<td>Improvement of children’s achievements</td>
<td>19.86</td>
<td>35.00</td>
</tr>
<tr>
<td>Establishment and straitening of democratic-liberal style of communication with children</td>
<td>19.13</td>
<td>18.57</td>
</tr>
<tr>
<td>Children’s maturity for school has improved</td>
<td>9.03</td>
<td>50.00</td>
</tr>
<tr>
<td>Nothing has changed</td>
<td>3.25</td>
<td>2.86</td>
</tr>
</tbody>
</table>
It is worth mentioning that working on the pre-school education programme in their institution enabled educators to better penetrate into the modern approach to children’s education (50.9% of pre-school and 55.0% pre-primary educators). The statement that education has become better adapted to children’s needs, their developmental possibilities and individual learning styles, is supported by 65.34% of pre-school and 70.71% of pre-primary educators. About 42.96% of pre-school and 57.14% of pre-primary educators think that new more varied and innovative forms and methods of education organisation have appeared, whereas about 45.85% of pre-school and 53.57% of pre-primary educators see education as more diverse. According to the opinion of 50.0% of pre-primary educators, children’s maturity for school has increased working according to pre-primary education programme. Thus, the programmed had an effect on the (self-)development of children’s competences and innovativeness of education process organisation. The qualitative research of educators and parents revealed similar tendencies.

A considerably smaller influence of the programmes was observed on strengthening of democratic-liberal style of communication with children (19.13%-18.57% of educators) and on the quality of children’s life in the groups (26.35%-29.29% of educators). It can be concluded that these aspects of children’s education were of high quality prior to creation of the new education programmes since the results of qualitative research show that parents are satisfied with the quality of these aspects of children’s education.

Slightly more than one third of educators (30.69%-39.29%) think that working according to pre-primary education programme, parents’ needs and expectations are better met, and only 27.44%-32.14% of educators point out that parents involve into the process of their children’s (self-)education in an institution more actively. This also corresponds to the results of qualitative research, which show that neither parents nor educators are satisfied with mutual collaboration.

Thus, qualitative and quantitative research on parents’ and educators’ opinion allowed for identification of the most important changes in quality of pre-school and pre-primary education over the last decade.

**Conclusions**

The conception and criteria of education quality are arbitrary in terms of contemporary educational theories. All the participants in the process of children education are both providers and receivers of pre-school and pre-primary education services. Meanwhile, the data of the quantitative research allow for a conclusion that there is no clearly determined agreement of professional educators and society on the accepted definition of quality education. The attitude of parents to the quality of education is different from that of the educators: Children’s well-being and proper care are of importance to parents, whereas the educators’ emphasis is not only on children’s well-being, but also on the quality of their education. The conception regarding the quality education among professional educators working with children of different ages has not been finally defined yet.

Following the data of the qualitative research, educators and parents notice the following features of liberal humanistic paradigm of children’s education in pre-school and pre-primary education institutions: attitude to children as personalities, which is noticed by parents but not emphasised by educators though realised by them in the process of children’s education; an increasing attention to children and their individuality and problems faced realising this approach; striving for children’s well-being in children’s (self-)education institutions, whose achievement is hindered by the failure of educators to identify children’s bad mood, emotional condition and reasons for them; empowerment of children with a possibility for free expression of own opinion, for choice and actions, which is realised only partially.
Following opinion of parents and educators, which was revealed by the qualitative research, education institutions realise the principles of the most important strategic documents of education: Children’s needs are met in a qualitative way; development of children’s competences is guaranteed, except for development of children’s abilities which does not meet parents’ needs and insufficient coping with children’s behavioural problems; the process of education sufficiently ensures satisfaction of children’s needs and (self-)development of children’s competences; however, its improvement is necessary.

According to the results of qualitative research data, educators negatively evaluate parents’ attention to children’s (self-)education, parents are unsatisfied with society’s consideration for young children’s (self-)education and educators’ professions; collaboration of education institution with parents is seen as partially meeting their needs by both parents and educators; according to educators, development of pre-school education programmes stimulated social partnership; working according to pre-primary education programme resulted in closer links between pre-primary education groups and schools.

Evaluating educators’ qualification and competence, parents emphasised educator’s vocation, their personal qualities favourable for children’s education as well as qualification and competences; educators themselves pointed to new roles that they perform, their increasing informality, flexibility, openness to innovations and experiential learning.

The quantitative research revealed similar tendencies. According to the data of this research, more than half of pre-school educators state that work on the development of the programme enabled them to better perceive a modern approach to children’s (self-)education; (self-)education has become more tailored to children’s needs and learning styles; two fifths of educators state that (self-)education has become more diverse and varied, new forms and techniques of education organisation have appeared. Pre-primary educators, working according to pre-primary education programme, pointed out practically the same positive changes and an improved children’s maturity for school.

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Riga: Izdevniecība Kreativitātes centrs.


Bibliotherapeutic Influence on Nigerian Female University Students: Self-report on Sexual Attitudes and Behaviors

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This study examines the influence of self-prescribed literature on sex education of female students at the University of Ibadan, Nigeria. The sample population consists of 303 married, engaged, those in love and those yet to fall in love female students. The analysis of data reveals that they read books specifically on friendship, love, marriage and sex, and other related literature on romance, suspense, adventure, science fiction and true life stories. Furthermore, the results show that the main opportunities of instruction on sex and sexual behavior open to the respondents are books, friends and hardly their teachers and parents. They do recommend similar sources of information to their friends and relations.

Keywords: bibliotherapy, sexual attitudes, sexual behaviors, female students

Introduction

Evidence exists, at least orally, that in some traditional African communities, some forms of guidance and counseling on sex and sexual behavior were given to spouses at the point of getting married and not before that crucial period of their lives. There were specialists who were mainly elderly men and women entrusted with the responsibility for guiding and counseling spouses on the observances, methods and the process of procreation in marriage. Therefore, in such traditional communities, it was not entirely the duty of parents to instruct or counsel their children on the human anatomy, and other expected and unexpected social and cultural attitudes and practices concerning sex. It was, however, the duty of parents to live decently and conduct themselves respectfully before their children. They also vehemently preached to them against immorality as dishonorable act. Essentially, it was partly done to gain and sustain a good family name in the community. A good family name was an invaluable social asset to the entire members of a family.

However, the advent of Western education and modern practices of living would seem to have greatly influenced the process of sex education even in the traditional communities in Nigeria. The newly emerged social and economic patterns of interactions in the traditional communities do not seem to support the communal interactions that had dominated human affairs in the traditional communities. Things have fallen apart and some of the adolescents now undergo a relatively long period of formal education, while some others

* In the evergreen memories of the author’s dear academic mentor and the father of reading education in Nigeria—Professor Solomon O. Unoh and the author’s colleague and friend—Dr. N. M. Ibudeh (clinical psychologist). They provided the author with the initial materials in the discipline of bibliotherapy.

Oshiotse Andrew Okwilagwe, Ph.D., associate professor, Department of Library Studies, University of Ibadan.
are involved in trades that take long period of apprenticeship. These new developments seemed to have resulted in the emergence of a new value system based on the Western social and economic precepts. It seems to have eroded the traditional value system in which the traditional community sex counselors were regarded and consulted and were of tremendous relevance.

Generally, the issue of sex education has received great attention in Nigeria in the form of debates on whether or not to institute sex education in the institutions of learning. The great debates seem to have subsided without a consensus on the status of sex education in Nigerian institutions of learning.

In the seemingly confused situation, in which the traditional institutions have been eroded and in which there has been no functional national policy on sex education, a social reference gap has been avoidably created. In spite of this gap, life has to go on. The adolescents have to grow. The question of where the adolescents turn to for vital information on sex and sexual related issues of love, friendship, marriage and pregnancy lingers on. Perhaps, in this situation, adolescents could turn to other immediate and readily available alternative sources of information, such as books, friends or haphazardly gather information by way of experience in the course of their growth into adulthood. Thus, this study examines whether reading of books exerts any influence on the attitudes and behaviors towards sex and other related issues among female university students in Nigeria.

Review of Related Literature

The important issue of reproductive capacity of the human beings is of great social significance in African communities and was once of central focus of great philosophers and scholars. For instance, as was noted by Akinboye (1984):

The Greek philosophers speculated about certain aspects of puberty which today are called secondary sexual characteristics. Of the 110 characters in Plato’s dialogues 12 to 14 are adolescents. Both Aristotle and Plato made references to certain aspects of adolescence, and systematic, developmental patterns were delineated in other early writings... And there is no doubt that many Africans addressed the subject orally as reflected in their traditional practices. For example, circumcision rites, the keeping of youngsters in fertility rooms before marriage and other rituals connected with the menarche in girls indicate the seriousness with which Africans take the issue of puberty. (p. 483)

Different perspectives on human sexuality have been provided by different scholars as shown by Hart (1979) and Collins (1981). Although the perspectives of scholars vary considerably, the undisputable point of convergence, however, is that, though human sexuality has some biological tincture, the human attitudes and behaviors towards sexuality are mediated through social processes in the human ecological system. Therefore, meaningful interpretation of the biological developments taking place in the adolescents which are quite beyond the control or manipulation of the adolescents is capable of producing stress if the adolescents are not given appropriate guidance and counseling. Related to this view, according to Akinboye (1984), the natural developments in the adolescent have definite pressure on him/her and could account for his/her sexual conduct. However, this instinctual life of the individual, if properly mediated by social experience through guidance and counseling, could be channeled into social harmonious expression by the individual concerned.

The point being established here is that a careful analysis of the interaction of biological and social variables as they affect sexual conduct could, to some reasonable extent, provide some insight or explanation to the adolescent’s sexual attitude and behavior. Why it may not be quite a difficult problem to explain the biological determinants of sexuality in the Freudian fashion, it would appear hardly possible to account for the social sources of the Nigerian adolescent’s sexual attitudes and behaviors in the present situation, in which sex
education is not taught in schools and where it is doubtful if it is at all taught in homes in Nigeria.

**Bibliotherapy and Human Behavior**

In the modern human society, the new entrants are usually socialized into the culture primarily through interpersonal and mass media processes. In this discussion, our focus is on the influence of the book medium of mass communications on value system acquisition and behavior modification.

The literature on bibliotherapy indicates that the educators, librarians, physicians, psychologists, nurses and the occupational therapists are in consensus that the book exerts tremendous effects on the human spirit and impacts heavily on human behavior. In some instances, the extent of such impact is so gripping and the total of that it is immeasurable. Nenashev’s (1987) experience explained this point. According to him, there was neither radio nor television in the village where he grew up. Books were his principal sources of cognition, information and intellectual growth. He could not imagine how the importance of books in a man’s life can be exaggerated. Another example that indicates the great impact of books in people’s lives was reported by Tonga (1997) as follows:

> There was this lady. Everybody thought that she would not have a happy marital life because she did not socialize when she was a spinster. When eventually she got married, she was an example to the ladies in her area. When she was asked how she was able to adjust and cope, she informed her admirers that she picked her experiences from the literature texts she had read when she was a virgin and spinster. (p. 46)

The practice of using books to enrich, modify or change human behavior is known as bibliotherapy. Schrank and Engels (1981) threw light on the origin and use of bibliotherapy as follows:

> The ancient Thebans cherish books for their value in adding quality to life through communication, education, contemplation and therapy. Writers usually trace the practice of bibliotherapy to that era and society. Books have been used ever since as primary sources of entertainment, instruction and healing. (p. 143)

Bibliotherapy has been variously defined by many scholars such as Tews (1962), Schrank and Engels (1981), Unoh (1981), Alekseychick (1989), Hynes (1990), Randolph (1993), Aiex (1993), Gladding (1994) and Myracle (1995). For our immediate need here, we will use only the following two definitions:

1. Bibliotherapy means guided reading that helps individuals gain understanding of the self and environment, learn from others and find solutions to problems. It consists of three fundamental processes between readers and literature: identification, catharsis and insight. Identification begins with an affiliation between a reader and a character (or situation) in a story. This identification may expand one’s view of self or reduce one’s sense of being different from others. Catharsis takes place when readers share and vicariously experience motivations and conflicts presented in literature. Readers often realize their identifications and thus gain insight into motives of their own behaviors. Insight occurs when readers see themselves in the behaviors described in the reading materials (Schrank & Engels, 1981);

2. Bibliotherapy can be defined as the use of books to help people solve problems. Bibliotherapy is a family of techniques for structuring interaction between a facilitator and a participant based on mutual sharing of literature (Aiex, 1993).

Bibliotherapeutic intervention may be undertaken for many reasons among which, according to Aiex (1993), are to:

1. Develop an individual’s self-concept;
(2) Increase an individual’s understanding of human behavior or motivations;
(3) Foster an individual’s honest self-appraisal;
(4) Provide a way for a person to find interests outside of self;
(5) Relieve emotional or mental pressure;
(6) Show an individual that he or she is not the first or only person to encounter such a problem;
(7) Show the individual that there is more than one solution to a problem;
(8) Help a person discuss a problem more freely;
(9) Help an individual plan a constructive course of action to solve a problem.

Schrank and Engles (1981) indicated that:

There is considerable evidence to suggest that bibliotherapy may be an effective practice in effort to modify attitudes. Moreover, this evidence is broadly-based, concerning people and topics throughout the life span and human condition. (p. 143)

Research indicates that bibliotherapy has been used by participants with the aim of improving their level of academic achievement, assertiveness, attitude change, helper effectiveness, marital and couple accord, self-concept, self-development and therapeutic gains (Schrank & Engles, 1981).

The practice of bibliotherapy should be handled with measured care, however, in much the same way in which a professional can carry out a bibliotherapy exercise, an individual can also make a judicious choice of books to effect definite self-determined bibliotherapeutic objectives. This view that an individual can embark on self-book therapy accords with that of Moore and Brelad (1962) that:

Just as in the general field of physical medicine, the use of treatments ranges from the self-administered aspirin to the physician-prescribed drug, so also in the field of psychological medicine, books or treatment agents range from self-selected readings of novels and magazines to the carefully, professionally selected books and articles. (p. 227)

**Procedures and Methods**

The population for this study is made up of undergraduate female students at the University of Ibadan, Nigeria. A total number of 500 copies of a validated and pretested questionnaire were administered to the respondents at the three female halls in the university. Of the total number of the copies of the questionnaire returned, 303 copies were found to be usable for this research. The respondents consisted of 45 (14.9%) married; 62 (20.5%) engaged to getting married; 88 (29.0%) who were in love; 46 (15.2%) who are yet to fall in love; and 62 (20.4%) who did not belong to any of the above categories.

A purposive method of sampling was used to ensure that only those who indicated prior interest to participate in the research, by accepting to fill the questionnaire, were used as respondents. It was necessary to adopt the purposive sampling method, because it was discovered during the pilot research that some female students would not accept to fill the questionnaire because according to them, it is asking too intimate questions that need divulging personal and private information.

**Data Analysis**

The data collected from the respondents were subjected to a simple descriptive statistical analysis of frequency counts and percentages to show the responses to questions and describe the characteristics of respondents collectively.
Results

Importance of Books, Types and the Topics Read

Table 1 is a composite of three items. Firstly, the majority of respondents indicated that the knowledge they acquired from books was of importance to their attitudes and behaviors towards sex and related issues (friendship, love, marriage, sexual intercourse and pregnancy). Secondly, respondents indicated that they read different types of sex related books, such as romance stories, suspense stories, true life stories, adventure stories and science fictions. The major concentration of interest fell on true life stories, 121 (39.9%). Thirdly, the respondents were interested in reading books on friendship, love, marriage, pregnancy control and sexual intercourse. The major concentration of interest falls on topics on friendship and love, 172 (56.8%).

Table 1

<table>
<thead>
<tr>
<th>Item of response</th>
<th>Very important</th>
<th>Important</th>
<th>Less important</th>
<th>Not important</th>
<th>No response</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>The importance of books to your knowledge, attitudes and behaviors towards sex and other related issues</td>
<td>110</td>
<td>126</td>
<td>42</td>
<td>20</td>
<td>5</td>
<td>303</td>
</tr>
<tr>
<td>Types of books read</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Romance</td>
<td>Suspense</td>
<td>True life stories</td>
<td>Adventure</td>
<td>Science</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>84</td>
<td>34</td>
<td>121</td>
<td>43</td>
<td>21</td>
<td>303</td>
<td></td>
</tr>
<tr>
<td>Topics of interest read</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Pregnancy control</td>
<td>Sexual intercourse</td>
<td>Friendship and love</td>
<td>Marriage</td>
<td>No response</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>26</td>
<td>172</td>
<td>71</td>
<td>—</td>
<td>303</td>
<td></td>
</tr>
</tbody>
</table>

The data in Table 1 establish the fact that the respondents were of the opinion that reading books on sex and other related issues is of importance to their knowledge, attitudes and behaviors towards sex and other related issues; they read romance suspense, true life stories, adventure and science stories; and they were interested in reading themes or topics on friendship, love, marriage, pregnancy control and sexual intercourse.

Information Sources and Their Comparative Relevance on Sex and Other Related Issues (Friendship, Love and Marriage)

The results of data analysis in Table 2 show that books and friends were the major sources of information: 185 (61.1%) followed by parents and teachers and 62 (20.5%) available to the respondents. Respondents were of the view that information from books and other sources are both relevant to their information needs on sex and other sex-related issues. The respondents indicated that the relevance of information from books did not surpass the information from other sources in value and vice-versa.

Perception of the Influence of Books

The results of data analysis in Table 3 indicate that a large number of the respondents agreed/strongly agreed, 120 (39.6%) and 29 (9.6%) respectively, that in reading of books they gained knowledge on how to get involve in sex and other related issues. While 79 (26.1%) and 66 (21.8%) strongly disagreed/disagreed respectively that they have been influenced by the books they read. However, as it is further shown in Table 3, a large proportion of the respondents has been positively influenced 105 (34.7%) and a relatively large
Proportion has both been positively and negatively influence 99 (33.7%), while 82 (27.1%) has had no form of influence from the reading of books. The result of data analysis in Table 3 indicates that the respondents were divided on the two items of how knowledge gained from books influenced involvement in sex and other sex related issues and on the nature of the influence. It is however, obvious from Table 3 that books could exert positive and negative influences on the readers.

Table 2

Information Sources and Their Comparative Relevance

<table>
<thead>
<tr>
<th>Information sources and their comparative relevance</th>
<th>Parents &amp; teachers</th>
<th>Books &amp; parents</th>
<th>Friends &amp; teacher</th>
<th>Books &amp; friends</th>
<th>Other sources</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>62</td>
<td>15</td>
<td>30</td>
<td>185</td>
<td>11</td>
<td>303</td>
<td></td>
</tr>
<tr>
<td>20.5%</td>
<td>14.9%</td>
<td>9.9%</td>
<td>61.1%</td>
<td>3.6%</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Information from books is more relevant than other sources

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agreed</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>No response</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>110</td>
<td>110</td>
<td>39</td>
<td>21</td>
<td>303</td>
</tr>
<tr>
<td>7.6%</td>
<td>36.3%</td>
<td>36.3%</td>
<td>12.9%</td>
<td>6.9%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 3

Perception of the Influence of Books by Respondents

<table>
<thead>
<tr>
<th>Perception of influence of hooks</th>
<th>Knowledge gained of how to be involved in sex and other related issues</th>
<th>Nature of the influence of books</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>Strongly disagree Disagree None of the above No response</td>
<td>Positive Negative Negative &amp; positive None of the above No response</td>
</tr>
<tr>
<td>29</td>
<td>79</td>
<td>66</td>
</tr>
<tr>
<td>9.6%</td>
<td>26.1%</td>
<td>21.8%</td>
</tr>
<tr>
<td>105</td>
<td>99</td>
<td>82</td>
</tr>
<tr>
<td>34.7%</td>
<td>32.7%</td>
<td>27.1%</td>
</tr>
</tbody>
</table>

Social Mobility Skills Gained From Books

Respondents were asked to indicate whether or not they have gained some skills that enabled them to relate well with members of the opposite sex through reading books. Data in Table 4 show that a very large proportion of the respondents 49 (16.2%) and 122 (40.3%) respectively, indicate that they gained some social mobility skills and that they relate well with members of the opposite sex, 204 (67.3%).

Utilization of Knowledge Gained by Reading Books on Sex and Other Related Issues

Respondents were asked to indicate the use to which they have put the knowledge gained by reading books on sex and other related issues (see Table 5). The data analysis indicates that 203 (67.0%) of the respondents have been able to avoid unwanted pregnancies. Out of the respondents, 132 (43.6%) indicate that they have frequently been able to avoid unwanted pregnancies, while 51 (16.8%) were not able to.

On the question of the likelihood of misapplication of the knowledge gained, an overwhelming majority of the respondents, 138 (45.5%) and 95 (31.4%) disagreed/ strongly disagreed respectively that they would misuse such knowledge. It is right to suggest based on the results of data analysis in Table 5 that the respondents have had some bibliotherapeutic gains.
Table 4
Benefits by Reading Books on Sex and Related Issues

<table>
<thead>
<tr>
<th>Item of response</th>
<th>Benefits by reading books</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Benefited from books</td>
<td>214</td>
</tr>
<tr>
<td>Development of social mobility skills through reading of books</td>
<td>70.6%</td>
</tr>
<tr>
<td>Relating well with members of the opposite sex</td>
<td>16.2%</td>
</tr>
</tbody>
</table>

Table 5
Utilization of Knowledge Gained From Books on Sex and Related Issues

<table>
<thead>
<tr>
<th>Item of response</th>
<th>Utilization of knowledge gained by</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Avoidance of unwanted pregnancy</td>
<td>203</td>
</tr>
<tr>
<td>Frequency of avoidance of unwanted pregnancy</td>
<td>132</td>
</tr>
<tr>
<td>Likelihood of misapplication of knowledge gained by reading books on sex</td>
<td>12</td>
</tr>
</tbody>
</table>

Patterns of Book Recommendation by Respondents

When asked to recommend to relations and friends the sex-related literature they had benefited from reading, 136 (44.8%) recommended romance and true life stories. Another 121 (39.9%) recommended books on friendship, love, marriage and sex, while other types of books received their share of recommendation (see Table 6).

Table 6
Patterns of Book Recommendation by Respondents

<table>
<thead>
<tr>
<th>Types of books</th>
<th>Patterns of recommend books</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Books on friendship love marriage &amp; sex</td>
<td>A &amp; B</td>
</tr>
<tr>
<td>(B) Romance stories</td>
<td>B &amp; F</td>
</tr>
<tr>
<td>(C) Suspense stories</td>
<td>C &amp; D</td>
</tr>
<tr>
<td>(D) Adventure stories</td>
<td>D &amp; E</td>
</tr>
<tr>
<td>(E) Science fictions</td>
<td>E &amp; D</td>
</tr>
<tr>
<td>(F) True life stories</td>
<td>F &amp; B</td>
</tr>
<tr>
<td>Total No. of respondents</td>
<td></td>
</tr>
</tbody>
</table>
Discussion

It is evident from the study that the reading of books exerts therapeutic influence on the female university students. The study indicates the importance of the influence of books on the knowledge, attitudes and behaviors towards sex and other related issues like friendship, love, marriage and pregnancy of the university students. Furthermore, the study reveals that female university students read real life, romance, adventure stories and science fictions on sex and other related issues concerning their gender and relating to the opposite sex.

The major sources of information on sex education for female university students are books and their friends. However, data analysis indicates that the information from books and friends was not in any way more relevant to female university students than the information from other sources.

Through exposure to bibliotherapeutic literature, they gained some perspectives and social mobility skills which enabled them to deal competently with the members of the opposite sex. It is also evident from the results of the study that the reading of literature on sex and other related issues also exerts negative influences on the readers. The implication of this is that the reading of literature can also exert some psychological abnormalities on the readers. Therefore, care must be taken in the selection of literature for behavior modification by female university students. Jake’s (2005) seven points are relevant here and are worth thinking about when selecting literary resources, how well does the book help with: (1) fostering personal insight; (2) triggering emotional catharsis; (3) assisting with solving problems; (4) altering the ways in which clients act; (5) promoting satisfying relationships with peers; (6) providing information about shared problems; and (7) providing a good quality recreation experience.

Conclusions

Bibliotherapy can bring about attitude and behavior changes. While some books can morally and spiritually elevate, some other books can be morally and spiritually destructive. Therefore, bibliotherapy as a programme of selected activity involving reading materials, should be planned, conducted and controlled under the guidance of a professional or carried out by a mature person and/or a well self-directed individual, for the treatment of emotional and other problems.

Since the female university students mainly carried out self-administered bibliotherapy, it is pertinent that a judicious choice of literature is made in order to ensure that beneficial and non-counterproductive results are obtained from such bibliotherapy programmes.

Recommendations

The findings of this study point to the absolute need for a national policy on sex education in Nigerian educational institutions. Parents should be concerned to discuss sex and other issues with their children, at least to provide the initial information on the challenges of growing up and becoming young adults in a turbulent social-economic, political and cultural environment that is faced with serious problems of national value system and strong western institutions and precepts.

References


The Impact of Interactive Storybook on Elementary School Students’ Recall

Ertem Ihsan Seyit
Gazi University, Ankara, Turkey

This study investigated the effectiveness of animated interactive storybook on elementary school students’ recall. This experiment utilized 77 fourth grade students in three groups. Each student was randomly assigned with one of the three conditions: (1) computer presentation of interactive storybooks with animation; (2) computer presentation of storybooks without animation; and (3) traditional print storybooks. Students’ recall was measured by using multiple-choice test. The researcher used quantitative methods to analyze participants’ responses in the experiment. The results of statistical analysis indicated that there were significant differences in the students’ recall scores. The students who read the computer presentation of storybooks with animation showed significantly higher recall scores than those who read the computer presentation of storybooks without animation and the traditional print version of storybooks. In other words, animation used in an interactive storybook may help students recall better than no animation use.

Keywords: animation, elementary education, interactive storybook, literacy, recall

Introduction

In the 21st century, important and radical changes are occurring in the area of literacy and digital technology is changing the nature of literacy (Reinking, McKenna, Labbo, & Kieffer, 1998). Many researchers, theorists and applied scholars support this changing and transforming the nature of literacy, especially within and across new interactive environments (Reinking, 1998; Reinking et al., 1998; Tierney, 2008). Duke, Schmar-Dobler and ZHANG (2006) stated that, “Electronic environments have the potential to be one of the best things to happen to the field of reading comprehension in this field’s history” (p. 324). Moreover, “Electronic texts introduce new supports as well as new challenges that can have a great impact on an individual’s ability to comprehend what he or she reads” (Coiro, 2003, p. 458).

In the mid-1990s, literacy in new digital age, New London group engaged in the implications of broad social, cultural and technological change for the conception of literacy. New London group expressed particular attention to multimedia, interactive hypermedia, and the shift from print-based literacy towards digital texts, on-screen texts and literacy (New London group, 1996). Print is often thought of as a traditional technology that often serves as barrier, rather than a gateway, to learning. Even though traditional print texts require interaction between the reader and texts, they are passive, non-interactive with non-adaptable features, static with two-dimensional images, and cannot response to individual readers, restricted by their linear composition, and rely heavily on the reader’s internal strategies to activate prior knowledge (Doty, 1999; Pearman, 2008). On the other hand, interactive texts typically have different and new formats. These new formats are nonlinear,
non-sequential, interactive and can provide a literal interaction between the reader and the text (Coiro, 2003; Reinking, 1992; Schmar-Dobler, 2003; Sutherland-Smith, 2002).

Interactive storybooks are reading software for children in illustrated storybooks that help children develop visual recognition. In addition, these interactive storybooks offered more reading recall hints and a better background for stories than traditional printed texts (Doty, 1999; Reinking, 1998). Interactive storybooks are mainly designed to integrate texts, graphics, animations, music and other multimedia components in order to bring support to the story line (CHEN, Ferdig, & Wood, 2003; Glasgow, 1996-1997). Interactive storybook technology has significantly improved the potential to add animations for readers. Children could read the stories on their own or listen to the stories read and animate parts of illustrations.

**Statement of the Problem**

The problem was pointed out by Robb (2000), he claimed that, children’s interests in reading for pleasure and motivations to read reduced. New technologies offered great opportunities and great challenges (Dalton & Strangman, 2006, p. 88). As a scaffold learning environment, digital texts provide support to the students with diverse learning needs. Digital learning environments, through good qualities of flexibility of the media, have the potential of scaffold instruction in a rich variety of ways (Bus, De Jong, & Verhallen, 2006). For example, images and animated graphics can be incorporated into digital texts to supplement textual definitions, supporting vocabulary understanding and reading recall (Anderson-Inman, Horney, CHEN, & Lewin, 1994; Boone & Higgins, 1993).

However, the results of the few available studies are not consistent. Some of the studies have shown that interactive storybooks elements may also potentially become distractions (De Jong & Bus, 2002; Matthew, 1996; Okolo & Hayes, 1996; Trushell & Maitland, 2005; G. Underwood & J. Underwood, 1998). De Jong and Bus (2002) revealed that children’s understandings of a story’s contents were less supported by the interactive version than the traditional print book format. Additionally, the illustrations, games and attractive pictorial options included in the story motivate children but if they were not matching with the story, they could distract the children’s focus on the story instead of supporting the narrative’s reading recall and cause passive reading, and delay children’s early literacy developments (De Jong & Bus, 2002; Labbo & Kuhn, 2000; Matthew, 1996; Shamir & Korat, 2006; G. Underwood & J. Underwood, 1998).

Several questions remain unanswered such as do children passively view screens that distract their attentions away from the meaning making. Bus et al. (2006) emphasized that “additional work is needed to learn more about the effects of considerate animations as scaffolds to children’s story reading comprehensions” (p. 134). More studies are needed to test which particular feature of interactive storybooks such as animation interactivity of texts have potential to improve students’ recall when the story presented as static illustrations and animated illustrations (De Jong & Bus, 2002; Bus et al., 2006). For all these reasons, this study investigated the extent to animation of interactive storybooks which positively influence students’ reading recall.

**Purpose of the Study**

The objective of this research is to investigate the effectiveness of animated interactive storybooks on elementary school students’ recall. For this purpose, each student was presented with one of the three conditions: (1) interactive storybooks with animation; (2) storybooks without animation; and (3) printed version of storybooks. These three conditions were compared with respect to reading recall as measured by a multiple-choice test.
Significance of the Study

The results of the studies previously carried out in the reading area have been conflicting and are frequently hard to interpret. First, the animation effects were not controlled by the children. Second, narrated condition was integrated with animation as a part of storybooks. If there were any difference, it is not clear whether they come from narration and/or animation features of storybooks. Third, usually there was no obvious explanation or detail about what kind of illustrations or animations were used in the study. For this reason, in this study, the stories presented compared both static illustrations and animated illustrations. Narrative functions, word definitions and sound effects of storybooks were not used.

In summary, this research attempted to address some of the shortcomings of previous researches. This study provided empirical data to do specific and systematic investigation that confirms which features and types of story presentations are more effective than others to elementary students. Therefore, the following research question was addressed in this study: Are there any differences among reading recall scores as measured by the multiple-choice test when fourth grade students read the same storybooks presented in CD-ROM format with and without animation and a traditional print format?

Literature Review

Research findings are optimistic about the future of multimedia applications for readers. For example, Hegarty, Carpenter, and Just (1991) reported that animation in interactive texts help to illustrate unfamiliar processes for students with low mechanical abilities. Many features of interactive storybooks were well matched for phonemic awareness, phonics and fluency; vocabulary and reading comprehension (Pearman & Lefever-Davis, 2006). Computer software has the exceptional capacity to bring individualized practice to students who need to enhance their reading fluency (Oakley, 2003). The ability to recognize sound-symbol relationships is essential, but it is not enough for reading recall. Students must also activate their prior knowledge and use context hints to comprehend what they read. There is growing indication that computer-supported effects such as animation and sound allowing students to make these connections (Matthew, 1997). Greenlee-Moore and Smith (1996) indicated that the use of interactive storybooks might help improve reading recall of elementary students. In addition, interactive storybooks develop the story setting through animated graphics and sound effects indicating the story moods and events, and thus, supporting reading recall (Lefever-Davis & Pearman, 2005). Visual aids in interactive storybooks are helpful for understanding texts and building coherent mental representation. Multimedia presentation, which includes text, graphics, sounds, and animated images, is also a helpful motivation for a reader who is particularly uninterested.

This study is focused on animation in interactive storybooks. Literature review showed that there were little actual researches evaluating the use of animation in interactive storybooks. Scoresby (1996) reported that “there may be few researches which directly relate to the study of animations and narrative texts… literature implied a potential problem but failed to empirically establish that problem indeed exists, the need for actual research in this area is clear” (p. 31). Some authors caution about the potential distraction of animations in reading recall (Nibley, 1993; Okolo & Hayes, 1996; Scoresby, 1996). If animations do not support the text, they may draw students’ attentions away from the main points of the text and even hinder reading recall. DeJean, Miller and Olson (1997) and Scoresby (1996) found that animation in interactive storybooks divert from reading rather than improve it and the animation slows down the recall of textual information. Scoresby
(1996) also revealed that animation-available groups spent most time engaged in reading interactive storybooks. However, this extra time on task did not cause higher recall scores; the animation-available groups had significantly lower recall scores than those who spent much less time within the storybook.

However, many studies have shown that illustrations and animations that support or amplify accompanying text improve students’ reading recall. For example, Matthew (1996), L. Miller, Blackstock, and R. Miller (1994) demonstrated interactive storybooks in stimulating children in reading development. Trushell, Maitland, and Burrell (2003) found that graphic animations could offer background support for readers by providing supplemental information. Interactive storybooks combined sound effects and animations to provide rich context that supported vocabulary and concepts (ChanLin, 2001; Pearman & Lefever-Davis, 2006). Interactive storybook technology contains extensive sequences of animation that are not found in traditional texts (Ocolo & Hayes, 1996; Scoresby, 1996).

Methodology

The experimental design of the study used independent measurement. The participants were 77 students \((N = 77)\) enrolled in a fourth grade classroom and from economically and culturally diverse elementary schools in the United States. The participants’ ages ranged from 9 to 11, with a mean of 9.96 years. Forty-eight participants were female and 29 were male.

The multiple-choice questions were written by the researcher according to Pearson and Johnson’s (1978) taxonomy of reading recall questions. Textually explicit (factual questions) and textually implicit (inferential questions) were used to examine whether the students recalled the elements of the story (Leslie, 1993). Content validity was used for validity evaluation of reading recall tests. Content validity is a subjective form of validity evaluation. It consists of opinion and judgment as the method to derive valid test. In more sophisticated situations, a test designer may begin with original instrument and then receive additional test item assessments from experts in the field. Items may be added, modified or dropped, according to the experts’ opinions. This method is the strongest form of content validity (Balian, 1994).

Data Collection

Students who have previously read and/or seen the storybooks were eliminated in the study. Because the storybooks that were previously unknown to participants are important for this study. The first group of students \((N = 25)\) read interactive storybooks with animation on the computer. The second group of students \((N = 26)\) read without animation of storybooks on the computer. The third group of students \((N = 26)\) read the same stories on print version.

Prior to data collection, students in the interactive storybook groups were given directions for using the computer. For the purpose of data collection, the students read the following storybook, which was published in both print and interactive CD-ROM format—Arthur’s Teacher Trouble by Brown (1994).

After reading, the students answered on paper based 13 multiple-choice questions. The time limit was 20 minutes. They were not allowed access to the stories during the test. The reading recall tests contained multiple-choice questions that required the student to select the correct answer. Students received one point for correct responses, and zero points for an incorrect or missing response. The highest total possible score was 13 point for this assessment. The students’ responses were to be scored by the researcher.

Data Analysis

ANOVA (one-way analysis of variance) was performed to compare the groups on the basis of outcome
measures at the significance level of 0.05. The SPSS (Statistical Package for Social Sciences) used for the purposes of data entry, manipulation, and analysis. According to Balian (1994), ANOVA is the most traditionally and widely accepted form of statistical analysis. ANOVA can test three or more group means utilizing a single statistical operation. ANOVA accomplishes its statistical testing by comparing variance among the groups to the variance within each group. A significantly statistical finding would indicate that group means were significantly different from each other. In case of a significant statistical finding, there is a need to use a Post-Hoc test to find exactly which groups differed from other groups (Balian, 1994). In this study, because of a significant finding from ANOVA, Bonferroni test was used to find exactly which group differed from others.

**Results**

ANOVA indicated that there were a significant differences in reading recall scores on a multiple-choice test ($F = 12.529; p < 0.05$) among students reading interactive storybooks with animation, storybooks without animation and traditional print storybooks. For the reading recall scores on a multiple-choice reading recall test, a higher level of reading recall score was reported in the reading interactive storybooks with animation condition ($M = 9.60, SD = 3.15$), followed by traditional print storybooks condition ($M = 7.62, SD = 2.37$) and storybooks without animation condition ($M = 6.19, SD = 1.58$). The results are displayed in Table 1.

Table 1

<table>
<thead>
<tr>
<th>Analysis of Variance for Reading Recall</th>
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<tbody>
<tr>
<td>df</td>
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<tr>
<td>Reading recall test total: Between groups</td>
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<tr>
<td>Within groups</td>
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<tr>
<td>Total</td>
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</tbody>
</table>

Notes. $df = $ Degree of freedom; $F = $ Fisher's $F$ ratio; $SD = $ Standard deviation.

The results of the Post-Hoc test comparing three groups in terms of the reading recall are provided in Table 2.

Table 2

<table>
<thead>
<tr>
<th>Post-Hoc (Bonferroni) Test Results for Reading Recall Scores</th>
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<tbody>
<tr>
<td>(I)Conditions</td>
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<tr>
<td>With animation</td>
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<tr>
<td>Printed</td>
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<td>Without animation</td>
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<tr>
<td>Printed</td>
</tr>
<tr>
<td>Printed</td>
</tr>
<tr>
<td>Without animation</td>
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</tbody>
</table>

Note. $^*$ = The mean difference is at the significant level of 0.05, $p < 0.05$.

According to the Bonferroni Post-Hoc test results, significant differences were found between the interactive storybooks with animation group and the interactive storybooks without animation group ($p < 0.05$), between the interactive storybooks with animation and the traditional print storybook ($p < 0.05$). There was no
significant difference between the storybooks without animation and the traditional print storybooks ($p = 0.116$) (see Table 2).

**Conclusions**

The goal of this study was to compare and explore the effects of the media of storybooks presentations on students’ reading recall. Three different presentations of storybooks, with animation, without animation format and traditional paper based format were compared with respect to reading recall as measured by the multiple-choice test.

The study provided some encouraging results relevant to those interested in the use of new digital technology to improve the fourth grade students’ reading recall at the elementary school level. Reading recall scores were higher for students reading the interactive storybooks with animation than those reading the storybooks without animation (static illustration) and printed storybooks.

Although, there were some concerns about interactive texts that could distract the attention of students, they could also cause cognitive overload and damage reading recall of these readers (Duke et al., 2006). This study found that interactive storybooks might be beneficial in helping students better understand the narratives and animation feature of interactive storybooks which have the potential to improve students recall.

A possible explanation of higher reading recall scores for interactive storybooks with animation group lies in the interactivity that storybooks allow. The rich visual support and animation in the interactive storybooks used in this study may be a reason that influenced the amount of reading recall. Sutherland-Smith (2002) stated that images in interactive texts were more lifelike than in traditional print texts.

**References**


Student Teachers’ Expectations of Teaching as a Profession in Malaysia

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Teacher education is an essential professional development for student teachers. The knowledge of both subject matter and how to teach provides some guidance on how teachers make sense of their learning. Teaching expectation is an important topic that has been discussed by educational researchers in order to explain not only why students choose teaching profession, but also why some of them leave off the profession. The present study tends to explore the expectations of student teachers towards teaching as a profession. The sample consisted of 295 student teachers. The results show that in general, student teachers were ready to teach, and the expectations towards teaching profession were high. Some of the findings include: (1) The student teachers were ready to teach their own specialist subjects but not other subjects; (2) Pupils’ achievement is the single most important outcomes in teaching; and (3) The right way of teaching pupils is more important than knowledge of their specialist subjects. The implications of these findings on theory and practice of teacher education programme were also discussed.

Keywords: teaching expectations, student teachers, teacher education

Introduction

Teacher education is an essential professional development for student teachers. The programme prepared student teachers in terms of knowledge and skills of both subject matter and how to teach (Wilke, 2004). As suggested by Pajares (1992), besides the core subject content and structure, it was also important to take into account related variables, such as expectations of student teachers, because it gave some guidance on how teacher made sense of their learning during the teacher education programme. Teaching expectation is an important topic that has been discussed by educational researchers. The degree of match between teaching expectation and the reality of what teaching is as a job is one important area that has been developed by researchers, particularly to explain on the motivation among student teachers. For example, a longitudinal study by Wilhelm, Dewhurst-Savellis, and Parker (2000) from 1978 to 1993 suggested that entering teaching with positive expectations might have a significant impact on retention.

Expectations of student teachers can be classified into two main categories, namely, expectation towards teaching and the teaching profession and expectations of the teacher education programme. Literature showed that students entered teaching programme with mixed expectations towards teaching. Some entered with high expectations about their ability to do the job well and effectively (Richards & Killen, 1994). Their expectations toward effective teachers include motivating students and being warm and personable (Collins, Selinger, &
Pratt, 2003; Holt-Reynolds, 1992), as well as the ability to maintain interest and class control (Joram & Gabriele, 1998). With regards to teacher education programme, some possess limited and simplistic views. They expect that teaching merely involves transmitting information (Feiman-Nemser, McDiarmid, Melnick, & Parker, 1989). Others expect teaching as one which is telling, nurturing and hold parent-like practices (Holt-Reynolds, 1992; Wilke, 2004). Some student teachers did not expect much from their teaching programme (Joram & Gabriele, 1998) and expected they would be good teachers without any preparation (Mertz & McNeely, 1991). They were also less interested in what they perceived to be theories during their coursework (Whitbeck, 2000; Wilke, 2004; Collins et al., 2003; Wideen, Mayer-Smith, & Moon, 1998). Instead, they expected knowledge of teaching would be from the actual practice in the field or when they eventually entered the classroom (Feinman-Nemser et al., 1989; Joram & Gabriele, 1998).

Teaching expectations, like other variables related to educational beliefs, i.e., self-efficacy, motivation, perception, develop from personal experience, experience with schooling and instruction as well as experience with formal knowledge (Richardson, 1996). This included 12-13 years of experience in watching and participating in classroom as a student (Feinman-Nemser et al., 1989; Gunstone, 1989; Mertz & McNeely, 1991). As a result, researchers, such as Johnson (1988) and O’Loughlin (1988) believed that the pre-existing educational beliefs were very influential and this might explain the reason why attempts to inculcate new beliefs during the teacher education programme were sometimes fruitless.

In order to provide better understanding towards teaching expectations, it is important to explore factors that influence students to become teachers as well as factors given by students who withdraw themselves from the teacher education programme. Literature showed that the appealing factors can be divided into three categories, namely, intrinsic, extrinsic and altruistic factors (Kyriacou, Hultgren, Stephens, & Hultgren, 1999; C. Papanastasiou & E. Papanastasiou, 1997). The intrinsic reason was related to the act of teaching itself where people who loved teaching enjoy every teaching moment to the fullest (Parkay & Hardcastle, 1991). On the other hand, extrinsic factors included benefits attached from embarking in teaching, such as good pay and privilege of having long. Altruistic reason involves factors related to students’ wellbeing, such as wanting to help them succeed. In contrast, the main reason why students withdrew from teacher education programme was that they simply found the work more demanding than what they expected (Chambers, Coles, & Roper, 2002; Chambers & Roper, 2000). Thus, it can be concluded that expectation plays a prominent role in influencing students to choose teaching profession as well as to stay in it. However, despite numerous studies (Goddard & O’Brien, 2003; Purcell, Wilton, Davies, & Elias, 2005; Wilhelm, Dewhurst-Savellis, & Parker, 2000), little attention has been paid specifically to the initial expectations of teaching (Kyriacou & Kunc, 2007). As such, this study was designed to explore the expectations towards teaching as a profession of the student teachers in Malaysia.

Teacher Programme in Malaysia

In Malaysia, the training of student teachers for both primary and secondary schools is mainly provided by the 28 teacher training institutes as well as the 11 public universities. The 28 teacher training institutes conduct specialist the teacher education programmes, namely, the post graduate diploma in teaching. This is a one-year course with minimum intake qualification of a bachelor degree. The programme emphasizes on pedagogy and other relevant teaching skills. Meanwhile, all the 11 public universities also provide student teacher education programmes, namely, the bachelor degree of education programme. This is a five and a half years’ course with minimum intake qualification of matriculation or Higher School Certificate (an equivalent
The programme stresses on both content knowledge and teaching skills. Its main aim is to produce secondary school teachers.

In sum, these teacher education programmes are geared towards the professional, academic and personal development of the student teachers in order to equip them with relevant knowledge, skills and abilities. Nevertheless, the main issue in the teacher education programme in Malaysia is related to the quality of the teachers produced. Teacher training programmes do not usually take into consideration the actual problems encountered by teachers, such as in teaching mixed ability classes. Mohd. Daud, Mustapha, Lee, Khadijah, Ismail, Zulkifli, and Chew (2000) reported that although the teachers are able to dispense teaching competencies that have been emphasized in their training programmes, they lack abilities to ensure that their students can follow and understand their lessons. It is not uncommon that lessons are taught as a whole, where weak students are usually neglected while the more abled ones are not intellectually challenged.

**Methodology**

The subjects for this study were 295 student teachers (72 males and 223 females) from a local teacher training institute. All were enrolled for the Post Graduate Diploma in Teaching. Majority of the samples ($N = 203$) or 68.8% were Malays, compared to ($N = 62$) or 21.0% local Chinese, and ($N = 30$) or 10.2% local Indians. One hundred and sixty eight student teachers or 56.9% had some experience in teaching, with large composition of them (72.6%) with less than a year of experience. The median age for the sample was 27 years old. The student teachers completed a questionnaire during one of their teaching sessions to ensure a 100 percent response rate. The structured questionnaire used in this study comprised of 18 items adapted from Kyriacou and Kunc (2007). The student teachers’ expectations were measured using a four-point Likert-scale (1 = Strongly agree, 2 = Agree, 3 = Disagree, 4 = Strongly disagree). Six items were designed to measure readiness towards teaching while the other twelve items each had a specific statement measuring student teachers’ expectations of teaching profession. The overall internal consistency of the questionnaire was 0.77.

**Findings**

The responses to the questionnaire are shown in Tables 1 and 2. Overall, the student teachers were ready to teach (mean = 1.50, $sd = 0.46$). In Table 1, a high percentage (61.7%) of the student teachers are absolutely certain that they are ready to teach their own specialist subjects, although 5.1% of them said otherwise. In contrast, when asked to teach other subjects, the percentage drops significantly to only 31.2%. The respondents also expect that they are ready in terms of keeping rules and discipline in the classroom as well as facing students with different abilities. Another observation is that student teachers were generally less in favor of discussing both academic and discipline matters with students’ families.

As it is depicted in Table 2, the expectations towards teaching profession was high (mean = 1.67, $sd = 0.50$). Investigation on individual items showed that the respondents have high agreement for the item “I will feel elated by pupils’ achievements”, followed by “I believe I will have a good rapport with my students”. Although ten respondents or 3.4% were of the opposite, the majority of the respondents believe that teaching profession is the most suitable career for them. The student teachers also endorsed that teaching profession is still well respected by people and they will have adequate time to do a good job. In addition, they hope to be promoted into the school management position rather than stayed forever as basic teachers. However, they are neither particularly sure whether the payment will be sufficient nor the profession will fulfill their personal needs.
Table 1

Mean and Standard Deviation of the Readiness Towards Teaching

<table>
<thead>
<tr>
<th>Items</th>
<th>Mean</th>
<th>sd</th>
<th>Percentage of response (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am ready to…</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teach my own specialist subject.</td>
<td>1.43</td>
<td>0.59</td>
<td>61.7 33.2 5.1</td>
</tr>
<tr>
<td>Keep rules and discipline in order.</td>
<td>1.43</td>
<td>0.52</td>
<td>58.3 40.3 1.4</td>
</tr>
<tr>
<td>Face students with different abilities.</td>
<td>1.43</td>
<td>0.51</td>
<td>59.0 40.3 0.7</td>
</tr>
<tr>
<td>Discuss with students’ family with regards to learning difficulties.</td>
<td>1.52</td>
<td>0.53</td>
<td>49.8 48.5 1.7</td>
</tr>
<tr>
<td>Discuss with students’ family with regards to discipline.</td>
<td>1.57</td>
<td>0.57</td>
<td>46.5 49.8 3.7</td>
</tr>
<tr>
<td>Teach other than my own specialist subject.</td>
<td>1.75</td>
<td>0.57</td>
<td>31.2 62.7 5.8 0.3</td>
</tr>
</tbody>
</table>

Notes. 1 = Strongly agree; 2 = Agree; 3 = Disagree; 4 = Strongly disagree, sd = Standard deviation.

Table 2

Mean and Standard Deviation of the Expectation Towards Teaching

<table>
<thead>
<tr>
<th>Items</th>
<th>Mean</th>
<th>sd</th>
<th>Percentage of response (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I will feel elated by pupils’ achievement.</td>
<td>1.20</td>
<td>0.40</td>
<td>80.3 19.7</td>
</tr>
<tr>
<td>I believe I will have a good rapport with my students.</td>
<td>1.46</td>
<td>0.52</td>
<td>55.0 44.7 0.3</td>
</tr>
<tr>
<td>The teaching profession is the most suitable career for me.</td>
<td>1.52</td>
<td>0.58</td>
<td>51.9 44.7 3.1 0.3</td>
</tr>
<tr>
<td>Teaching is still well respected by people.</td>
<td>1.64</td>
<td>0.65</td>
<td>45.4 45.4 9.2</td>
</tr>
<tr>
<td>I will have enough time to do a good job.</td>
<td>1.68</td>
<td>0.62</td>
<td>39.7 52.5 7.8</td>
</tr>
<tr>
<td>In future, I hope to be involved in management (head of panel, head of department, senior assistant, etc.).</td>
<td>1.70</td>
<td>0.66</td>
<td>40.0 51.2 7.8 1.0</td>
</tr>
<tr>
<td>The payment will be sufficient for my lifestyle.</td>
<td>1.92</td>
<td>0.61</td>
<td>21.4 66.4 10.8 1.4</td>
</tr>
<tr>
<td>Teaching will fulfill my personal needs.</td>
<td>1.94</td>
<td>0.65</td>
<td>24.0 59.0 16.3 0.7</td>
</tr>
<tr>
<td>Teaching is the right career because I can spend a lot of time with my family.</td>
<td>2.19</td>
<td>0.77</td>
<td>17.6 49.2 29.5 3.7</td>
</tr>
<tr>
<td>In my opinion, teachers will have more bad time than the good one.</td>
<td>2.26</td>
<td>0.70</td>
<td>11.9 53.2 31.9 3.0</td>
</tr>
<tr>
<td>Teaching training has prepared me for the job.</td>
<td>2.67</td>
<td>0.66</td>
<td>3.0 34.6 54.6 7.8</td>
</tr>
<tr>
<td>Teaching pupils is more important than knowledge of my specialist subject.</td>
<td>2.77</td>
<td>0.64</td>
<td>3.7 23.4 65.1 7.8</td>
</tr>
</tbody>
</table>

Notes. 1 = Strongly agree; 2 = Agree; 3 = Disagree; 4 = Strongly disagree, sd = Standard deviation.

Discussion and Implications

In examining the readiness of student teachers, a high mean was found. The findings were consistent with the study by Abdul Rahim, Mohd Majid, Rashid, and Lyndon (2008) that student teachers had high level of confidence in both classroom management and instructional strategies. It is also consistent with the conclusion in Bourdoncle and Robert’s (2000) study that student teachers show great understanding in: (1) How they manage their action; and (2) How to influence the learning of their students. Quite interestingly, however, these tasks are all perceived as extremely difficult by beginning teachers (Veenman, 1984). Similarly, Halford as cited in Rahimah et al. (2006) reported that beginning teachers were always assigned to students with most diverse and challenging needs. The findings also showed that the respondents tended to dodge themselves from teaching other than their specialist subjects. This may provide some difficulties since it is a norm in the teaching profession that beginning teachers are often required to teach other than their specialist subjects.
The present study also found that the student teachers’ expectations towards teaching profession were high. The result, however, was not in line with other studies (Abdul Rahim et al., 2008; Ediger, 2002; LaCour, 2005) those student teachers’ expectations and attitudes were rather moderate. Placing too high an expectation may have some negative effects. For example, since the respondents place high expectations on students’ achievements, it would be very discouraging if they find themselves teaching in a school with very limited opportunity to help students to succeed. Similarly, many student teachers expect to be involved in the school management within a few years. Again, if this does not occur, they may feel frustrated. In Malaysia, student teachers receive an allowance of RM 16,320 (USD$ 4,663) during their training programme. The amount is considered huge and one might speculate that with that kind of amount, student teachers would expect more on the positive side of teaching. It is also possible that the respondents may have overstated their expectations since the majority of them have less than one year of experience.

The expectation is a continuum. Therefore, it is essential to determine the importance of these expectations towards teaching profession. The most important expectation would certainly be the one that if not fulfilled would lead to the student teacher leaving the profession. The least important, meanwhile, may purely consider as part of learning curves. Then, the teacher education programme may be geared towards making sense of these expectations. However, this is easier said than done since not only expectations differ from one another, they also vary over time. For example, as documented by Kersaint, Lewis, Potter, and Meisels (2007), financial aspects became more important when a teacher starts a family compared to during the duration when he/she undergoes his/her teacher education programme. Therefore, detailed longitudinal studies that assess how expectations change over time would certainly provide valuable information on how student teachers “balance” their high expectations with reality checks in the classrooms.

Conclusions

When a student teacher makes a choice to enter the teaching profession, the decision is similar to what any other student makes in entering any other career choices. The choice may be based on their personal satisfaction or extrinsic factors such as the pay and reward. In Malaysia, teaching has undergone tremendous changes in both aspects that lead to an influx of students choosing the profession. Classroom reality has also undergone drastic changes. However, for the student teachers, many of them come with expectations related to the past, during their schooling periods, but not the present and certainly not the future. Therefore, it is essential for teacher education programmes to provide a platform to enable our students to be sure of what they would expect life in the teaching profession to be like.

References


STUDENT TEACHERS’ EXPECTATIONS OF TEACHING AS A PROFESSION IN MALAYSIA


