RECENT ADVANCES on EDUCATION and EDUCATIONAL TECHNOLOGIES

Proceedings of the International Conference on Education and Educational Technologies (EET 2015)

Barcelona, Spain, April 7-9, 2015

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Teachers' Perception on Free Screen Capture Software

Taeil Yi

***Abstract*—**There are several commercial and free screen capture tools available, and finding the appropriate one is a difficult task, especially for one doesn't have pre-experience. This study examines in-service high school mathematics teachers' perceptions, who are novice to screen capture programs, about the use of free screen capture programs to produce lecture videos for high school students. Teachers investigated and compared assigned programs (Bandicam, BB Flashback, Screencast-O-Matic, or ezvid) with a selected benchmark program (Jing) based on their experiences of each program's ability to support video productions. The study concludes that certain programs are more effective than others in installation, setting for audio, easiness of production procedure, post-editing (if possible), and sharing/uploading to a server or YouTube. In addition, selected programs are recommended, especially for beginners to produce their own lecture videos first time.

***Keywords*—**Screen Capture, Lecture Video, Teacher Education, Online Teaching Module

I. Introduction

IT is obvious that distance (online) learning becomes a very popular new teaching and learning trend in second and higher education fields. About 12 million post-secondary students in US take some or all of their classes online in 2009 [10]. According to references [5], [9], [18] and [19] technology including open source learning management systems plays a vital role, and providing well designed course contents is an important part of students' success who are taking the online/hybrid courses. When these contents are provided for a traditional style course, they are also beneficial for the students taking the course when students miss classes for school activities and/or personnel situations [4]. There is no doubt that visual/audio component such as lecture video is the most important tools for students' success in online courses. Reference [21] even showed that 'students participating in an online interactive video session had higher learner satisfaction and better learning outcomes than those in a traditional classroom session.' Screen capture program allows instructors to easily capture the action and sound from computer monitor as well as the narration. It produces a movie file or a streaming video for the distribution on the internet or the presentation in class.

On the other hand, even most instructors in secondary and higher education fields are subject experts, they have variable technology skills, and usually lack the skills for producing lecture videos, mainly because of lack of knowledge of screen capture programs. Without an expert's guidance some may choose a program with a hopeful assumption that it would provide the service they expect. Other obstacles are that the program they choose could be expensive, and it may have a steep learning curve. One should spend a lot of budget and time to become proficient with the program. The cost of professional development on technology skills is high, and the support of schools are not enough most likely.

Freely available screen capture programs will be an excellent answer to this dilemma. Recently, many free and nice screen capture programs have been developed, and some of them are almost as good as commercial counterparts. Without spending a lot one can have these programs. Since some of these programs are easy to learn how to use them, one doesn't need to spend a lot of time to learn and produce lecture videos they want. Many studies have been done on the use of screen capture programs to produce visual (with audio) components [1]-[3], [6], [7], [11]-[16], [20], [22], and most of them tend to be accounts of the instructor's or experts' experience.

In this article we examine 22 in-service high school mathematics teachers' perceptions, who are novice to screen capture programs, about the use of free screen capture programs to produce lecture videos for high school students. This study concludes, based on participating teachers' perceptions, that a certain program is more effective than others in installation, setting for audio, easiness of production procedure, post-editing (if possible), or sharing/uploading to a server and/or YouTube. The author also recommends some programs, especially for high school and college mathematics instructors who want to produce their own lecture videos first time.

II. Method

This study was done in a graduate course spring 2014. Twenty two (consisted of 12 female and 10 male) in-service high school mathematics teachers enrolled in this course, titled 'Integrated Technology into Mathematics,' which is a required course of the Teaching Track of MS in mathematics degree program in the University of Texas at Brownsville. These teachers have taught ranging Algebra 1 through AP Calculus courses with average 10 years' experience in Rio Grande Valley area in South Texas. Through this course several free and/or open source computer software and programs were introduced such as a dynamical geometry software (GeoGebra), LaTex (MikTex and TexStudio) for making presentation file (Beamer), another presentation program (Prezi), a monitor capturing program (Jing), some Java codings for producing online questions with feedback,

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an eLearning xhtml editor (eXe), a wikisite (WikiSpaces) for teaching, etc.

Teachers were introduced a free screen capture program, Jing, as a benchmark program, and practiced on producing lecture videos. All of them were novice to screen capture programs and never used them before at the time of the study. After getting used to using the program, about a month later, teachers were assigned to produce a lecture video of their own, teaching the Theorem of Thales by using the dynamic graph they had produced using the GeoGebra program before. After the production of the lecture video teachers were assigned to other free screen capture programs as a part of the final project. Because of the course schedule they didn't have enough time to check all the other screen capture programs, and they picked one program freely. Since the choice of program was free elective, the programs were not equally distributed among teachers, and it turned out that 7 teachers elected Bandicam, another 7 for BB Flashback, 5 for Screencast-O-Matic, and the remaining 3 for ezvid. They did the similar procedure as they did with Jing, such as downloading and installing the program, making/editing (if possible) lecture videos teaching mathematical concepts for high school students, and uploading/sharing the videos on their wikisite or Youtube. The course instructor did not involve this part, and teachers did it by themselves without the instructor's guidance.

A pre-designed questionnaire was given to the teachers after they choose programs, and they answered the questions in the questionnaire while they were working with a newly selected screen capture program by comparing it with the benchmark program, Jing. The questionnaire consists of 6 categories: Set up, Monitor, Sound, Recording formats, File saving, and Post file editing. Several distinguished items are assigned to each category according to the nature of the category. The following is the list of those 6 categories with its items.

1. Set up
   a. Condition such as Price, trial period, etc.
   b. Installation
   c. Starting program
   d. (add at least one more item of your choice)
2. Monitor
   a. Recording areas (entire monitor, window, selected area, etc.)
   b. Reassigning area, size
   c. Movable before and during recording
   d. Zoom in/out while recording
   e. Cursor appearance
   f. (add at least one more item of your choice)
3. Sound
   a. Audio set up
   b. Volume adjustment
   c. Typing sound
   d. (add at least one more item of your choice)
4. Recording formats
   a. Screen recording - Mp4, flash, avi, etc.
   b. Screen capture – jpg, gif, emp, etc.
   c. Recording time limit
   d. Record webcam
   e. Company logo watermark
   f. (add at least one more item of your choice)
5. File saving
   a. Company library/repository
   b. YouTube posting
   c. (add at least one more item of your choice)
6. Post File editing
   a. Video
   b. voice-over
   c. Caption/scripts
   d. Marking
   e. Inserting figure
   f. (add at least one more item of your choice)

Teachers were asked to put their own findings/differences between the benchmark program and the assigned program for each category. At the end of the questionnaire they were also requested their testimonial about which program is better than the other based on their findings according to the pre-provided questions including their own findings. The questionnaire and the video produced with Jing were submitted to the course instructor at the end of semester, but the videos they made with the selected target programs were not collected.

III. Procedure and Findings

A. Set Up

All selected five programs are free, and can be downloaded from websites. Some of them needs to be registered, especially to get some services. BB FlashBack says 30 day trial period, but this only means that after the 30 day trial it requires a registration to get a free license and continue using the program. The ezvid site requires the user to donate before download, which is not necessary.

To install BB FlashBack requires to register first before the user receives an email with the download link. After the installation the user has to resubmit a request to get the license number. Then the user should get another link to confirm the license number. The website would not accept just any email address, and might need to try several different addresses. Ezvid is difficult to find the link on the website. Many pseudo download links on the site and may contain malware. The installation of the other is easy to follow and quick. Screencast-O-Matic can make a record from a browser without installation (after install a Java plugin).

Jing takes time to start the program. Ezvid is also loaded slowly. BB FlashBack has an icon on the desktop to open the program. The user has to close the window to open the program. One can move the Jing icon around the sides of the screen, and BB FlashBack has a standard icon only movable on the monitor, not on the sides. BB FlashBack has upgraded versions that allow you to edit the video. Jing does not offer any upgrades to edit the video. Screencast-O-Matic can be upgraded to the pro version ($15/year) to extend recording time (See Table 1).

B. Recording - Video

All five programs allow the user to capture the entire screen, a selected window, or a selected region. The default setting of ezvid is the entire screen, but the user can choose

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Table 1 Set up

Setup	Jing	Bandicam	BB Flashback	Screencast-O-Matic	ezvid
Price	Free	Free	Free	Free up to 15 min.	Free
Trail Period	No	No	No	No	No
Installation	Required	Required	Required	Required (or not)	Required
Setup-Installation	Easy	Easy	Medium	Easy	Difficult
Starting Program	Slow	Fast	Fast	Fast	Medium
Upgrade	No	No	Yes	Yes	No
Uninstallation	Easy	Easy	Easy	Easy	Easy

Table 2 Recording – Video/Screen capture

Video	Jing	Bandicam	BB Flashback	Screencast-O-Matic	ezvid
Area selection	Yes	Yes	Yes	Yes	Yes
Movable area	(before)	Yes	Only before	Yes	Only before
Webcam record	No	Yes	Yes	Yes	Yes
Cursor appearance	Yes	Yes (can hide)	Yes	Yes	yes
Zoom in/out while recording	No	No	No	No	Yes (while editing)
Pause/re-start	Yes	Yes	Yes	Yes	Yes
Recording time	5 min.	10 min.	No limit	15 min.	45 min.
File format	swf	Avi	fbr	Mp4,Avi, flv, gif	Avi, mp4, wmv
Screen capture	Yes	Yes (jpg, gif, bmp, png)	No	No	No
Recording retrieval	Yes	Yes	Yes	No	Yes
Company logo	No	Yes	Yes	No	Yes
Handwriting while recording	No	Yes	No	No	Yes

the advanced setting and capture a selected portion of your screen. BB FlashBack allows the user to change the size of the window by changing the dimensions or changing the numbers. Once it starts recording the user cannot change the window size, but when the recording stops, especially if the user made a mistake, the program will ask if the user wants to record again with the same settings. Screencast-O-Matic is the only one can reselect the recording area during the recording. BB FlashBack selects the screen first and then the user can change it. However Jing makes it easier to do by just dragging where the user wants to capture. Once Jing starts recording, the size of the recording cannot be changed. If the user needs to record again, the recording area should be set up again.

Ezvid can reassign the area or the size of the window using advanced settings. Ezvid gives you the option to record pieces of your video and put them together. The audio and video can be recorded separately and then put together. The recording area is limited to three sizes: smaller (100%), medium (125%) and larger (150%), which must be selected advanced recording to select size, otherwise the entire monitor is selected automatically.

Bandicam and screencast-O-Matic allow the user to move the window during recording. For the other programs the user can adjust the recording area only before the recording begins. Users can use a drawing tool in ezvid. The user can record pieces of the video at a time and change the view in between. Bandicam, BB FlashBack and Screencast-O-Matic can accept webcam input. Bandicam allows webcam input overlay on the monitor recording. Screencast-O-Matic even allows the user to switch between the webcam and the monitor while recording, or can record picture-in-picture webcam recording while it records the monitor, which is the most favorite feature to the teacher assigned to this program.

All programs do not allow the user to zoom in and out during recording. Ezvid (and BB FlashBack Pro version) allows to zoom in and zoom out after the recording is complete. All programs allow the user to move the mouse and capture while recording. However a sort of highlighted circle (BB FlashBack) or a rectangle (Screencast-O-Matic) is shown instead of an arrow in the recording. The user can hide the cursor in the Bandicam program while recording. When the drawing tool of ezvid is selected the user cannot move the cursor on the screen.

Except BB FlashBack, the other programs have the recording buttons right below/above the recording frame, making it easy to access. BB FlashBack shows the buttons aside from the screen, so the user has to navigate aside from the frame to access it. The user can pause and restart the record in all 5 programs.

All programs have different time limits for recording except BB FlashBack. Jing can record up to five minutes, and the color of the timer will become red after 4 minute recording. The user could choose several different file formats for the recording. Except Bandicam, other programs can upload the file to the company's server, YouTube, and other social media without converting (see Table 2). Only Jing and Bandicam can allow the user to take screen captures. The company logo watermark appears on the recording for Bandicam, BB Flashback and ezvid, which is one of the main complaints from teachers. The user can choose different graphic file to place as logo in Bandicam recording. The Jing logo appears at the end of the recording, so it doesn't bother them. While recording the user can put hand writing on the recording area in Bandicam and ezvid (See Table 2).

C. Recording - Audio

Jing, Bandicam and Screencast-O-Matic uses the microphone input as the default sound source. If the computer has more audio inputs, Jing and Bandicam will give more options to choose from. Bandycam and BB FlashBack allow the user to set up a secondary source of audio such as speakers and microphone at the same time. It is great because if something is playing on the computer, the sound will also be

Table 3 Recording - Audio

Audio	Jing	Bandicam	BB Flashback	Screencast-O-Matic	ezvid
Audio Set up	Easy	Medium	Medium	Easy	Medium
Volume adjustment	Yes (through computer)	Yes (through computer)	Yes	Yes (through computer)	Yes
Capture multiple sounds	No	Yes	Yes	No	Yes
Audio and Video separation	No	No	Yes	No	No
Audio Indicator when recording	Yes	Yes	No	No	Yes
Audio mute	Yes	No	Yes	No	Yes

Table 4 File Saving

File saving	Jing	Bandicam	BB Flashback	Screencast-O-Matic	ezvid
Preview	Yes	No	No	No	No
Company repository	Yes	No	No	Yes	No
File Sharing	Yes	No	Yes	Yes	Yes
YouTube posting	No	No	Yes	Yes	Yes

Table 5 Post File Editing

File Editing	Jing	Bandicam	BB Flashback	Screencast-O-Matic	ezvid
Edit program	No	No	No	No	Yes
Post Editing – Video	No	No	No	No	Yes
Post Editing – Voice-over	No	No	No	No	No
Post Editing - Caption	No (Yes for still image)	No	No	No	Yes
Post Editing - Marking	No	No	No	No	Yes
Inserting Figure	No	No	No	No	Yes
Frame-by-frame video editing	No	No	No	No	Yes

recorded. In ezvid the first audio option given to the user is music. The user can play music during the 'ezvid' intro or during the video recording. That is, the user can have music play behind the user's voice. It has a voice synthesis that turn text slides into synthesized speech, although this is difficult with math notations. It is possible to record the video first, and then record the audio later. You can have music play behind your voice. You can set it up to record the audio and video at the same time.

When BB FlashBack is opened, the user has the option of entering tutorial sessions. The user can easily adjust the audio through computer's audio setting for both recordings, but BB FlashBack and ezvid provides audio adjustment feature. Typing while recording is slightly noticeable by all programs. BB FlashBack has the option to change the sound of the keyboard to avoid the noise. Sometimes it is important to synchronize the video and the sound in BB FlashBack since they can be saved as separate files. Audio can be saved to wav file and Sound bit-rate can be changed from poor quality to excellent quality (See Table 3).

D. File Saving

Only Jing gives the opportunity to preview the recording before saving it, which requires a flash player. Jing provides unlimited memory space in the server. Jing keeps the history of the recoding in the server, and the user can retrieve any of them. Bandicam, BB FlashBack, and ezvid save the recording a selected folder in the personal computer, so the user can access to them. However Screencast-O-Matic can keep only one file (up to 15 minutes or 2G). To make another file the previous one should be removed. BB FlashBack uses a number of different recording technologies to get the best from computers. It can capture unattended online events with scheduled recording. It can also make notes at record-time and view them during playback.

Each of the 5 programs has different file sharing features. Bandicam doesn't come with sharing feature except sending the file through e-mail attachment. Jing can save the record in the server and share the link to anyone. In Screencast-O-Matic the user can upload the file to the company server (SOM) and YouTube to share it. Ezvid automatically uploads the file to YouTube (See Table 4).

E. Post File Editing

BB Flashback comes with a separated editor program called 'BB FlashBack player' for evaluation. It allows the user to edit, add images, text boxes, etc. The user can crop the window that was recorded, and you can delete some frames of the video. Ezvid also has a similar editing feature. But none of these 5 programs has voice-over while editing. The user can insert text in BB FlashBack player and ezvid, and the computer can read the text in ezvid. The user can mark the video during recording or after recording in ezvid or BB FlashBack player, respectively. BB FlashBack player also allows the user to insert images, buttons, highlights, sounds, videos and arrows. Ezvid also allows inserting pictures, videos, and texts. So ezvid is the only program comes with editing features as a free program (See Table 5).

The number of participating teachers' favors on pre-determined items are given in Table 6.

IV. Result

Overall responses from teachers' testimonials are presented here highlighting the effectiveness of each screen capture program and the teachers' motivation towards using a specific program for their needs.

Two out of seven teachers assigned to BB Flashback program prefer it, and the other five teachers prefer Jing over BB Flashback. Three out of seven teachers assigned to Bandicam program prefer it, and the other four teachers prefer Jing over Bandicam. Two out of five teachers assigned to Screencast-O-Matic prefer it, two are neutral, and the other

Table 6 Preferred Program based on pre-determined items

	Jing	BB Flashback	Jing	Bandicam	Jing	Screencast -O-Matic	Jing	ezvid
Free (no restriction)	2							
Trial Period	3							
Easiness of Setup	7		4	1	1	2	2	
Starting program	3	2		7	1	4	1	1
Selection or recording area	2		1				1	
Area movability	3							
Movability during recording				6		3		
Cursor related		1		5	2			
Zoom in/out while recording		1						
File format		7		5		2		2
Screen Capture	7			1	4		1	
Recording time	1	7	1	5		4		2
Webcam record		7				3		2
Company logo/water mark	4		4		2			
Audio set up	3	4	5		1	3	1	
Volume adjustment		4			2		1	1
Company repository	7		7		5		1	
Youtube posting		7		5		5		2
Post editing – video		3						2
Post editing – voice-over		5						3
Post editing – caption/text		2						2
Post editing – Marking		1						2
Inserting figures		1						3

Table 7 Number of Preferred Items and Programs

	Jing	BB Flashback	Jing	Bandicam	Jing	Screencast -O-Matic	Jing	ezvid
Number of items on favor	47	64	30	49	21	28	10	33
Ratio	*1 : 1.36*		*1 : 1.63*		*1 : 1.33*		*1 : 3.3*	
Without 'editor feature'	47	47	30	49	21	28	10	19
Ratio	*1 : 1*		*1 : 1.63*		*1 : 1.33*		*1 : 1.9*	
Pre-selected items only	42	40	22	35	18	26	8	10
Ratio	*1 : 0.95*		*1 : 1.59*		*1 : 1.44*		*1 : 1.25*	
Basic items only	38	31	20	19	13	18	9	8
Ratio	*1 : 0.82*		*1 : 0.95*		*1 : 1.33*		*1 : 0.89*	
Favored program	**5**	**2**	**4**	**3**	**1** (2)	**2** (2)	**2**	**1**

one teacher prefer Jing over Screencast-O-Matic. One out of three teachers assigned to ezvid prefer it, and the other two teachers prefer Jing over ezvid (See Table 7)

This results is somewhat interesting. By counting participating teachers' favors on pre-determined items and their own findings, all 4 groups (each assigned to one of four comparing screen capture programs) selected the other program over Jing. We found that this result comes because of more features in the other program. For instance, BB Flashback and ezvid have editor mode which give 17 and 14 points more to BB Flashback and ezvid against Jing, respectively. Since BB Flashback doesn't provide the editor mode after the 30 day trial period and ezvid is difficult for the novice of screen capture programs, it turns out that the number of favored items between Jing and BB Flashback is flattered. When we count the pre-selected items (from the instructor) only, the numbers of favors are flattened more. Finally, the number of favors to Jing become greater than the number to the other program when we select basic items (from the pre-selected and teachers' findings) which are necessary for producing lecture videos, except Screencast-O-Matic. That is most likely matching with teachers' choice of their favor program (See Table 7).

The main reasons for Jing over some programs are no watermark, supporting PC and Mac, easiness of setup, user friendly, and easy to take screen captures. The reasons against Jing are the limit on the recording time (5 min.), no direct YouTube upload, no webcam input, and audio input from microphone only. The reasons for Bandicam over Jing are longer recording time, ability to change the recording area while recording, easiness to post on YouTube, chance for pre-setting of video quality, faster starting, and different recording formats. The reasons against Bandicam are the appearance of the watermark logo in the recording, and not supporting the Mac operating system. The reason for BB Flashback over Jing are no time limit for recording, webcam input, and audio inputs from several sources. The reason against BB Flashback are no indication for recording, and no screen capture. The reason for Screencast-O-Matic over Jing are longer recording time, several file formats, YouTube post, run from a browser without setting up on a computer, ability to change the recording area while recording, webcam input, and add a note/caption after recording. The reason against

Screencast-O-Matic is no screen capture. The reason for ezvid over Jing are longer recording time, adding background music (including your own), add customized watermark, free editor, voice synthesis, limit on selecting area sizes, and direct YouTube posting. The reason against ezvid are difficulty of installation, not easy to use, no option for no-music, add about 3 seconds of pre-video advertising, PC only, and can't save on the computer.

The below are a couple of selected comments supporting Jing over other programs.

> *"I think I will continue using Jing at home and in my classroom. I use Jing a lot to create handouts for my students because it is easy to insert the Geogebra constructions that I create. I also like it because I can take screen captures of the digital calculator and I include it into my reports or lesson plans. It is also easy to use if I need to record instructions of how to use a certain program. At work I am the Pre-Ap led teacher, and I need to train teachers in different things. Sometimes they forget easy steps so it is easy for me to record my instructions step by step and just send the link. I think any person that is not computer expert can use Jing."*

> *"I don't have lots of time to learn new programs. Jing is very user-friendly. I don't need to select from many choices to start recording. The recording quality is good. The main disadvantage of Jing is the 5-minutes limit for recording. Another reason I like Jing is because of its still image capture function. As a school teacher, I used to make my own worksheets and tests by cutting and paste papers using scissors and glues (or tapes). Now I use Jing to cut and paste to make my electronic files which is easy to store and retrieve. It saves paper, time and help me to organize my work."*

V. Conclusion

Technology related to teaching/learning plays a vital role in 21st century education [8], [17]. It helps to reduce many obstacles in delivering lectures and learning environment such as distance, cost, delivering hands-on activities, tutoring, and customized study modules. But most of secondary and higher education instructors do not have enough technology skills to produce lecture videos by themselves. It can be a difficult task for them even to choose the right program for the task. This study shows the pros and cons of several freely available screen capture programs based on peer novice instructors. The findings suggest Jing is the best screen capture program for beginners. It doesn't require too much pre-setting and post-editing procedure. The positive comments supporting Jing program are based on its ease and convenience to install and use and no watermark. Since the most common reasons for prefer other programs over Jing are more advanced features such as longer recording time, webcam input, direct YouTube posting or different sharing methods, we recommend Screen-O-Matic for better options for file sharing, especially YouTube posting. When one has enough practice and looking for more editing power, we recommend ezvid, which comes with the post-editing feature. If an instructor becomes an expert on producing lecture videos with any of these screen capture programs, and wants to have more powerful programs with more advanced features, we recommend commercial counterpart programs, such as SnagIt, BB FlashBack Player or Camtasia.

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Academic aspirations of primary school students in the context of parenting styles

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***Abstract*—**The study explored potential associations between academic aspirations of teenage primary school students, school achievement, parental aspirations, and parenting styles. Our findings draw attention to the importance of evaluating and promoting the development of academic aspirations in the sensitive period of adolescence, as aspiration levels get reflected not only in students' desired levels of achievement motivation, but also their school achievement and school success in general. The study, conducted on 366 adolescents, yielded a number of interesting findings that can be referred to in both school and home educational contexts involving adolescent population.

***Keywords*—** academic aspirations, adolescence, parental aspirations, parenting style

I. Introduction

CZECH educational system is – on an international scale – exceptionally stratified and selective [1], which encourages the formation of unequal educational aspirations in primary school students. A lot of research has been published concerning the effects of the socioeconomic context and cognitive and other mental abilities on school attainment. However, these effects are mediated by socio-psychological variables, which play an important role in the stratification process within the Czech society. Study of psychological factors related to school achievement might be helpful in designing and implementing effective strategies aimed at encouraging the development of desirable educational aspirations in teenagers.

Educational aspirations are a very important element in the educational process [2]. Formed and shaped through the various psychological processes, aspirations are conceptually linked to theories of human motivation and achievement needs. The present research was based mainly on Heckhausen's elaborated cognitive model of motivation [3], which includes the effect of individual time perspective. Among other things, the model attempts to address the issue of school motivation. Heckhausen assumes that achievement needs in the academic context are secondary (acquired) and generalized, i.e. they manifest in every situation that requires action resulting in evaluable performance. The evaluation can be performed either by other people, or by the actor herself. The development of the need for achievement – or the need for success – is influenced by parents' expectations and how strictly they require that the child meets them. If parents have adequate expectations of their adolescent children, express an autonomy-supporting attitude, encourage high and stable standards of performance and appreciate their children's achievements, it is likely that the adolescents will develop a high need for achievement [4]. Such individuals typically develop appropriate self-expectations (aspiration levels) and are ready to invest the necessary amount of effort to achieve success in performance-related tasks. However, parental expectations, adolescents' own experiences with success and failure and the consequences of these experiences are not the only factors affecting the development of achievement needs. Another important variable is the achievement orientation of the parents themselves [5]. For this reason, the present study explores the relationships between academic aspirations of primary school students and their parents in the context of perceived parenting styles.

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II. Method

Employing a quantitative cross-sectional design, we conducted a survey in which we asked respondents to complete a set of self-report measures. The study was largely exploratory, as many of the relationships, to our knowledge, have not been previously tested.

A. Research Aim

The main objective of the study was to explore potential associations between the students' aspirations, parental aspirations, school achievement, and perceived parenting styles. The secondary objective was to examine whether there were any gender differences in these associations.

B. Measures

The following measures were included in the survey:

A *questionnaire asking about demographic and other information* regarding the respondents and their parents. The questionnaire also contained questions about topics relevant to the aim of the study: family situation, academic aspirations, school marks, etc. Some of the items were free response or multiple-choice items; others were answered on a Likert scale.

Perceptions of Parents Scale (Grolnick, Ryan, & Deci, 1991, revised by Robbinson, 1994). The original version of the

scale, designed for children, contained two main subscales – Autonomy Support and Involvement. Robbinson's adaptation for adolescents also contains a third subscale – Warmth – which measures adolescents' subjective perception of their parents' friendliness (i.e. emotional attachment). There are 42 items in total, 21 asking about the mother's and 21 asking about the father's behaviour. All subscales showed good internal consistencies in our study (Cronbach's alphas ranging from .792 to .845).

C. Procedure

Data were collected in a single round at randomly selected primary schools in the Czech Republic. The questionnaires were distributed by instructed members of school staff so that the main instructions remained the same for all respondents. Participation on the study was entirely anonymous, and all relevant ethical issues were carefully considered. All participating schools later obtained a report on the main results of the study.

D. Sample

Our target population were students of 6th to 9th grades (aged 13 to 15, M = 14.0, SD = .68) attending standard primary schools. The final sample consisted of 336 respondents, 186 (55%) female.

E. Data analysis

Gender differences in aspiration levels were tested using the non-parametric Mann-Whitney U test. Differences between students' and parents' aspirations were assessed using the Wilcoxon signed-rank test. The correlations between the Perceptions of Parents subscales and other variables were tested by means of the non-parametric Kendall tau rank correlation coefficient (due to the extremely skewed distribution of variables representing school achievement, aspirations and parenting styles.

III. Results

The key findings of our exploratory study are summarized in this section.

A. Academic aspirations of students and their parents

Aspirations of both students and their parents were assessed on a 4-point scale (1 = completely disagree; 4 = completely agree). Descriptive statistics for the total sample and for boys and girls separately are summarized in Table I. Apparently, the level of academic aspirations in both male and female adolescents as well as their parents was considerably high (gender differences were non-significant). However, at the same time, adolescents viewed aspirations of their parents as significantly higher than their own aspirations ($p \leq .001$). This difference was observed in both girls and boys, and was more pronounced in boys. The correlation between adolescents' and parental aspirations was only weak to moderate (Kendall tau = .297, $p \leq .01$).

Table I. Descriptive statistics of the aspiration levels of students and their parents

Good school marks are really important for me.	Total	Boys	Girls
Mean	3.28	3.24	3.31
SD	.68	.67	.69
Median	3.00	3.00	3.00
Good school marks are really important for my parents.			
Mean	3.51	3.55	3.48
SD	.65	.61	.68
Median	4.00	4.00	4.00

B. Perceived parenting style, academic aspirations and school achievement

Table II shows the Kendall tau coefficients expressing the relationships between individual Perceptions of Parents subscales, and (both students' and parents') academic aspirations and school achievement. In addition to total sample, coefficients are also indicated separately for boys and girls, as we observed noticeable differences in effect sizes in the two subsamples. In general, correlations between parenting styles and academic aspirations were either weak (students' own aspirations) or close to zero (perceived parental aspirations). The Involvement and Warmth scores on the part of the mother correlated positively with respondents' aspirations. This relationship was somewhat stronger in girls than in boys. The opposite was true about father's parenting style – father's Involvement, Warmth and also Autonomy Support were more strongly (positively) related to aspirations in boys than in girls.

Table II. Correlations between academic aspirations, school achievement, and perceived parenting styles

Perceptions of Parents subscale	*Sample*	*Students' aspirations*	*Parents' aspirations*	*GPA*
Mother: Autonomy Support	All	0.083	-0.100*	-0.069
	Male	0.048	-0.164*	-0.134*
	Female	0.115	-0.059	-0.015
Mother: Involvement	All	0.176**	-0.008	-0.078
	Male	0.163*	-0.043	-0.080
	Female	0.176**	0.030	-0.066
Mother: Warmth	All	0.172**	-0.100*	-0.111**
	Male	0.154*	-0.179**	-0.155*
	Female	0.182**	-0.044	-0.070
Father: Autonomy Support	All	0.108*	-0.016	-0.188**
	Male	0.153*	-0.063	-0.242**
	Female	0.078	0.024	-0.137*
Father: Involvement	All	0.148**	-0.003	-0.160**
	Male	0.195**	0.046	-0.200**
	Female	0.108	-0.038	-0.123*
Father: Warmth	All	0.163**	-0.030	-0.213**
	Male	0.209**	-0.061	-0.292**
	Female	0.128*	-0.005	-0.143*

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** $p \leq .001$; * $p \leq .01$

With respect to parental aspirations, only two significant relationships were found, both of them negative: one with mother's autonomy support, the other with mother's warmth. However, the correlations were only significant in the male subsample. Thus, it appears that boys who perceive their mothers as warm and autonomy supporting also tend to perceive parental pressure towards high academic achievement as somewhat milder.

Significant, although relatively weak correlations were also found between academic achievement (final marks) and respondents' perceptions of their fathers' parenting style. The relationship was, again, stronger in boys than in girls. High autonomy support, warmth and involvement on the part of the father appears to be related to better school achievement (the coefficients are negative due to the Czech standard grading scale, where 1 is the best mark and 5 is the worst). The correlation between mother's parenting style and school marks was much weaker and significant only in boys.

IV. Limitations

Main limitations of the study are linked to the employed research design, which was solely based on adolescents' self-reports and questionnaires, and to the sampling procedure: The research sample could be unrepresentative due to the fact that data collection might have been permitted only at those schools where students generally achieved good results.

V. Discussion

According to the results obtained on our research sample, academic aspiration levels of both the adolescent respondents and their parents were considerably high, regardless of gender. This observation might have resulted from the fact that schools that agreed to participate on the study were especially those which showed somewhat greater interest in the topic. Hence, these schools might have been one of those which place exceptional emphasis on high academic performance of their students. This would be consistent with the findings of Buchmann and Park [1], whose study on educational and career aspirations in highly stratified systems showed that school type might have a strong effect on students' aspiration levels.

Still, respondents rated the aspirations of their parents as significantly higher than their own aspirations. This might have been partly caused by the fact that most parents were at least secondary school graduates. Research literature generally views high level of achieved education in parents as a positive predictor of academic aspirations in their children [6].

The observed relationships between perceived parenting styles and academic aspirations were either weak (students' own aspirations) or virtually non-existent (perceived parental aspirations). Still, several correlations emerged as significant. Two of them were identified between respondents' aspirations and mother's warmth and involvement – these relationships were slightly stronger in girls than in boys. With father's parenting style, the gender difference was in the opposite direction: Autonomy support, involvement and warmth were all slightly more strongly related to academic aspirations in boys than in girls, although the effects were significant for both genders. In contrast, with perceived parental aspirations, only two negative correlations were found: one with mother's autonomy support, the other with mother's warmth. These relationships, however, were only significant in the male subsample. Thus, boys who saw their mothers as highly autonomy supporting and affectionate also seemed to perceive parental pressure regarding good grades as less intense than other boys. These findings might find good application in practice, especially if considered in the context of continuous academic preparation in home environment. After all, parenting style, the presence or absence of either parent in the parenting process, as well as the way each parent participates on this process, undoubtedly contribute very significantly to the development of children's aspirations for high-quality school performance [7].

Regarding perceived parenting styles and children's school achievement, we found significant, although relatively weak correlations between school marks and father's autonomy support, warmth, as well as involvement. Again, the effect of father's parenting approach was more pronounced in boys. Still, the three dimensions of father's parenting style were all associated with better grades in both boys and girls. On the other hand, dimensions of mothers' parenting style showed much weaker correlations with school achievement. In addition, these correlations were only significant in boys. The effects of parenting styles on academic aspirations have been documented by a number of authors (see, for example [8]). A deeper exploration of these effects from the perspective of gender differences might be an interesting topic for further research in this area.

The promising nature of this direction in academic aspiration research is also justified by the internationally accepted social-psychological model and its variants, which were designed so that the path between socioeconomic antecedents and mental abilities on the one hand and achieved education on the other hand included social-psychological mediators such as motivation, value orientations, educational aspirations, parental support, parental expectations, etc. The model has been empirically tested several times [9] with the same general result: After controlling for the effect of social-psychological variables, the effect of socioeconomic background and mental abilities on achieved education was reduced to a minimum, supporting the above assumptions, as well as the suggestions of the present study.

VI. Conclusion

The findings of the present study, which was a part of a large-scale research project, contribute to a better understanding of the relationships between academic aspirations of adolescents and their school achievement,

parents' aspirations, and perceived parenting styles. A supplementary objective was an exploration of potential gender differences in the scope and size of these relationships. The results highlighted the role of the father in children's education, especially in boys. The findings are applicable especially in the context of continuous academic preparation in home environment and can be used to help promote the development of appropriate aspirations in teenagers in the domain of school achievement.

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A New Methodology to Design Thermodynamic Power Station Simulators for Marine Engineering Studies

Ángel Martin Costa, Rebeca Bouzón, José Antonio Orosa, and José Antonio Pérez

***Abstract*—**Nowadays professional training and education of marine engineers is experimenting with innovative approaches in order to accomplish new educational requirements, being higher education institutions a reference in new teaching and training techniques development. In this sense, it results very interesting analyzing the experiences and issues related to the process of adaptation of European studies to the European Higher Education Area, in accordance with Bologna declaration. This adaptation process is resulting more complex than expected, showing a higher than ever need of no face study hours by students, in such a way that is critical the employ of expensive training simulators stations. Consequently, in the present paper, a new teaching simulator was designed with the aim of establishing a new procedure to develop a low cost simulator for power stations that can be run in conventional computers.

***Keywords*—**Marine Engineer, IMO STCW, Power Stations, Teaching Simulators, EES.

I. Introduction

FOR centuries, the standards of training, certification and watchkeeping of civil officers and ratings were established by individual governments, usually without relevant reference to practices in other countries, in such a way that nowadays shipping standards and procedures varies widely worldwide.

Considering that shipping is an essential international practice used by countless productive industries and countries, in 1978, after significant efforts and collaboration among nations, the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (1978 STCW Convention) was the first attempt to establish basic requirements on training, certification and watchkeeping for seafarers on an international level [1].

This convention prescribes minimum standards relating to training, certification and watchkeeping for seafarers, which signing countries were obliged to meet or exceed.

Since 1978, many amendments to the 1978 STCW Convention Technical Annex have been adopted by several Conferences of STCW Parties or by IMO Maritime Safety Committee, expanding procedures to include all Contracting Parties, even those that are not members of the Organization.

The last amendments to the STCW Convention and Code were the Manila amendments, which were adopted on June 25th 2010, marking a major revision of the STCW Convention and Code [2].

The 2010 amendments were set to enter into force on January 1st 2012, under the tacit acceptance procedure with the aim of bringing the Convention and Code up to date with new technical developments, since they were initially adopted to enable the code to address issues that were anticipated to emerge in the foreseeable future.

Among the amendments adopted there are an important number of changes to each chapter of the Convention and Code, highlighting the following in the field of training and certification [1, 2]:

- Improved measures to prevent fraudulent practices associated with certificates of competency and strengthen of the evaluation process, monitoring of Parties' compliance with the Convention.
- New requirements relating to training in modern technology.
- New training and certification requirements for electro-technical officers.
- Updating of competence requirements for personnel serving on board all types of tankers, including new requirements for personnel serving on liquefied gas tankers.
- New requirements for security training as well as provisions to ensure that seafarers are properly trained to cope if their ship gets attacked by pirates.
- Introduction of modern training methodology including distance learning and web-based learning.
- New training guidance for personnel serving on board ships operating in polar waters.

As a result, nowadays professional training and education is experimenting with new approaches in order to accomplish new educational requirements, being higher education institutions a reference in innovative teaching and training techniques development.

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In this sense, it can be very interesting analyzing the experiences and issues related to the process of adaptation of European, and in particular Spanish studies, to the European Higher Education Area, in accordance with Bologna declaration [3-6].

Now, this new teaching procedures are being translated to particular subjects of marine engineering education, resulting this adaptation more complex than expected, showing a higher than ever need of no face study hours by students, in such a way that is critical the employ of expensive training simulators stations [7].

Because of the high cost of these simulators and the low number of institutions able to acquire then, few simulators of power systems have been developed for marine engineering studies, and only covering the main engine, combustion engines and gas turbines, forgetting the rest of critical complementary circuits of a conventional ship [7].

Other relevant problem of employing these simulators is that usually each one presents no more than a few places for students and only one place for the professor.

As a consequence, in a typical course with a number of 50 students of marine engineering per course, students can only work a very reduced number of hours with conventional simulators placed in simulator rooms of the nautical studies institutions, requiring as well the division of the students in many working groups, which limits even more the real number of face studying hours per student.

The final consequence of this problematic situation is a lack of experience of students in operation of equipment and systems and in particular the complementary circuits which are not related to the main engine [7, 8].

The solution to this problematic situation is to develop new generation software flexible simulators based on the specific needs of individual engineering studies, in order that they could be easily used not only for students, but also for novel engineers, to analyze real solutions in an ordinary environment, far away from simulator laboratories placed in the University.

Consequently, such simulators must be compatible with low cost computers, such as that computers employed in most real power stations.

With the aim of solving some of these issues, different research works have been developed in the last years about engineering systems simulations. For example, there are some software resources that allow marine engineers to reduce their learning time in different subjects, like Moodle applications for hydraulic and pneumatic systems and in particular software resources like Engineering Equation Software (EES) that let marine engineers to improve their learning of thermodynamics and its understanding of real thermodynamic cycles of power stations [8, 9].

In the present paper, a new teaching simulator was designed with the aim of establishing a new procedure to develop a low cost power stations simulator that can be run in low cost computers.

Due to the excellent results obtained during some previous studies of thermodynamic cycles with EES, a new step was taken by the programming option to obtain a executable file that can be adjusted to particular characteristics of marine engineering applications and also can be improved by professors during teaching years, or by engineers themselves in their specific working places, as a teaching tool for new workers in power stations.

II. Ship Engineering Simulators

One of the singularities of marine engineers that requires special training is the wide variety of working environments, covering from ships propelled by an internal combustion engine, a gas turbine, or a steam turbine, to different power stations on land, like for example, cogeneration and thermal plants, among others, which is not common in other engineering fields.

Consequently, for many years, it has been widely used simulators to training the students in many aspects of shipping, like for example standard communication phrases and other training methods that are usually applied in an engine room simulator, as the classical main engine room simulator used to simulate the control board of an engine room shown in Figure 1:

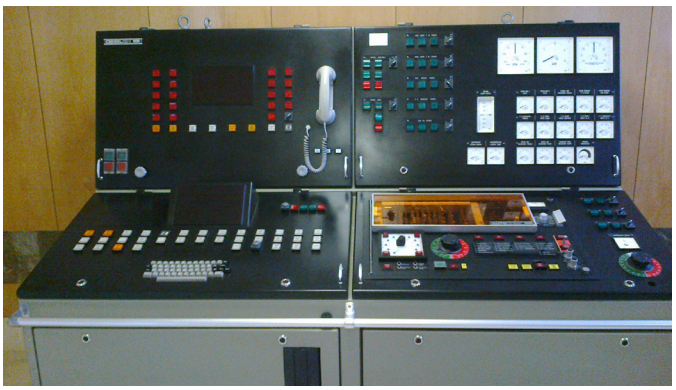

Fig. 1 Classical Main Engine Room Simulator

Nowadays, these obsolete classical simulators has been replaced by last generation computer software resources, covering several different aspects in the training of seafarers.

In this sense, it must be emphasized that in 1994, the Gdynia Maritime Academy showed the first in-depth research work about ship engineering systems simulators by obtaining the Computer Aided Assessment (CAA) to train marine engineers about different processes [10-12].

The same year, the first version of their PC-based diesel engine simulator was presented, allowing to simulate engine operation under several initial conditions and variable technical state. Some of the main tasks simulated were, for example, starting an engine, increasing and decreasing the engine load, and observing some other operative parameters, as shown in Table 1 [10]:

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Table 1. Main input variables in an engine room simulator

	Variable
1	Air filter
2	Air blower
3	Gas turbine air cooler
4	Gas leak through the piston rings
5	Fuel effective quantity decrease
6	Injection advance angle change
7	Decrease of cooling efficiency
8	Friction coefficient increase
9	Engine speed
10	Engine load
11	Ambient air (pressure and temperature)
12	Air cooling water flow
13	Cylinder cooling water temperature
14	Lubricating oil temperature and oil pressure drop at the oil filter

As results of training are very variable, to control and compare simulations among training cadets, a new output variable was selected for classifying the performance of the students, being the better operator the one who spends less money or time on simulated engine operation total cost, considering its maintenance, repair, and fuel management.

Another interesting result from these works is the DNV Maritime Simulator Classification shown in Table 2 [13, 14]:

Table 2. DNV Maritime simulator classification

Simulator	Main Characteristics
B (like Basic) Class Simulators	This family of simulators is like computer software and is designed to be run on a single PC.
P (like Personal) Class Simulators	These simulators model a specific engine room type and the simulator software can be run on a PC or in networked PCs working in real time.
F (like Full) Class Simulators	Highly realistic and expensive Full Mission Simulators.
S (like Special) Class Simulators	Include the specialized simulators which are usually computer programs to be run on a single PC but rather more complicated than B Class.

Employing this classification, it was concluded that class F and P simulators can fill the competences demanded by the STCW-95 and that a high realism of the operating environment is not so important in the B and S Class simulators. Furthermore, a P Class simulator for a ship engine room designed to reproduce a typical low-speed marine diesel engine and its auxiliary systems under a real-time operation is required [13].

The initial simulators consisted of a computer network, few engine room hardware consoles, and an Internet connection, as shown in Figure 2 [10].

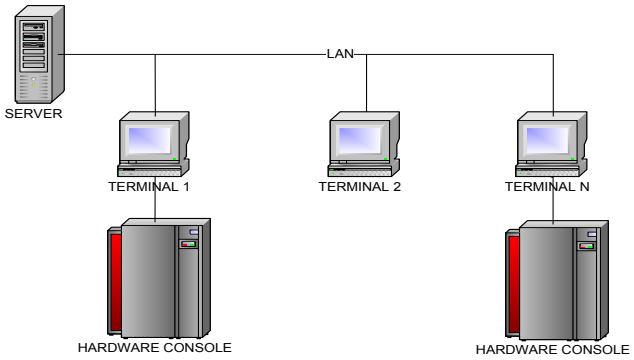

Fig. 2 Modular simulator hardware

These P Class simulators showed some advantages like a low hardware cost and flexibility of the hardware configuration, lower software development cost, and the possibility of a constant simulator software improvement, even when, despite this, it showed some disadvantages like a need of a team of 8 individuals during a 2-year period to finish and test it [10].

Furthermore, because these simulators are very expensive, they are not usually sold with all their modules, being possible to acquire each module could in accordance with the specific needs of each teaching institution or general user, and also be installed in different work stations and communicated by a control bus.

Even when the main research work about ship engineering simulators were revised, ship design engineering of a complete simulator was never done before as it is difficult to simulate different design modifications like fluids and pressure working conditions.

Current simulators are employed to understand the behavior of a designed installation, but they cannot be employed to simulate design changes like fluids or working pressure, among others [7].

This kind of changes are specially interesting for maintenance, repair and upgrade existing thermodynamic systems, which can be the origin of a second generation of simulators centered around training, operation, design and redesign.

As a consequence of this, the aim of this work is developing a methodology based on a better software tool to design simulators of specific installations and analyze its design and redesign options.

Moreover, these simulators must be applicable for use in different computers far away from the simulators laboratories placed in the universities, in such a way that the objective is ensuring that simulators must be applicable for use in low cost computers with poor technical characteristics, like low RAM memory and processor.

Finally, there must be an easy way to obtain a simulator for a specific installation where novel engineers could be trained prior to work in a real power plant.

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A. Engineering Equation Solver, EES

Dr. William Beckman and Dr. Sanford Klein developed at University of Wisconsin, the Engineering Equation Solver (EES) software to allow the user to concentrate more on the design, by freeing him from mundane chores, like looking up property information or solving equations [9].

The main differences between the EES and other equation-solving programs are as follows:

- The EES may be used to solve design problems in which the effects of one or more parameters must be determined beforehand.
- The EES automatically reorders the equations for an efficient solution, allowing entering of equations at random order with unknown variables placed anywhere.
- It provides an extensive built-in mathematical and thermophysical property functions, which are useful for engineering calculations. The transport properties are also provided for all considered substances.
- It allows to dynamic link and compile functions and procedures written in a high-level language such as C, Pascal or FORTRAN.

III. Simulator Design

A. IMO Model Courses

The methodology developed in this research work begins with a review of the International Maritime Organization (IMO) indications about the main results to be obtained from a simulator to be the base for the next generation of simulators.

IMO has designed a standard model of courses to help implementing the model training courses programme following the adoption of the STCW 1978 convention, in order to facilitate access to the knowledge and skills demanded by increasingly sophisticated maritime technology [1, 2].

These model courses related to the STCW Convention were revised and updated after the major revision of the Convention in 1995, and after the adoption of the Manila Amendments in 2010 to the STCW Convention and Code, many of the model courses has being revised and updated, where the 63 reference abilities specified in the standards of competence were grouped, under the following seven basic functions [1, 2]:

1) Navigation.
2) Cargo handling and stowage.
3) Controlling the operation of the ship and care for persons on board.
4) Marine engineering.
5) Electrical, electronic and control engineering.
6) Maintenance and repair.
7) Radiocommunications.

IMO also established three standard level of competence to be achieved for the proper performance of functions on board ship:

1) Management level.
2) Operational level.
3) Support level.

For this research work, the IMO course 33, titled 2.07 Engine Room Simulator, was employed as guidance to develop the present simulator in accordance with the IMO indications [1, 2].

B. The Cooling System

A conventional industrial cooling system employed to train marine engineers and placed in the laboratory of nautical studies center was employed as reference model to be simulated [15].

This cooling system was selected as it shows the same components as in a real system placed on board, as can be seen in Figure 3:

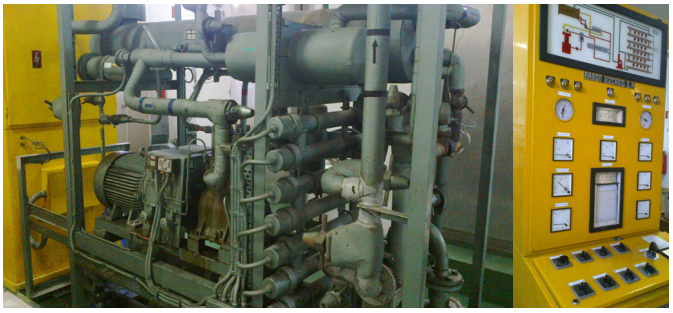

Fig.3 Marine cooling system laboratory

Figure 4 presents a schematic block diagram of the analyzed cooling system:

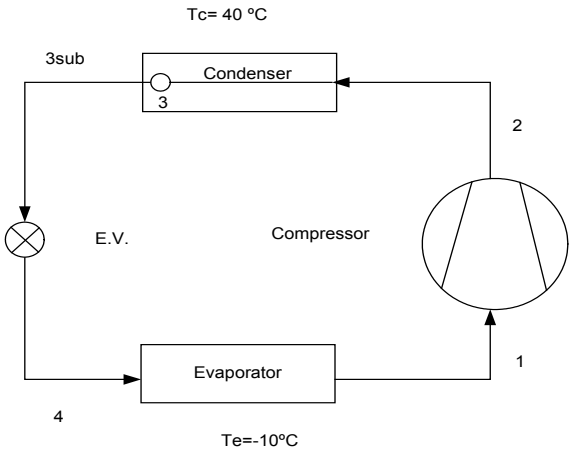

Fig.4 Simplified cooling system

It is interesting to note that, in most of marine cooling systems, as well as in this simulated cooling system, sea water is employed to cool the refrigerant fluid and reach condensation, between points 2 and 3 of the thermodynamic cycle shown in Figure 5:

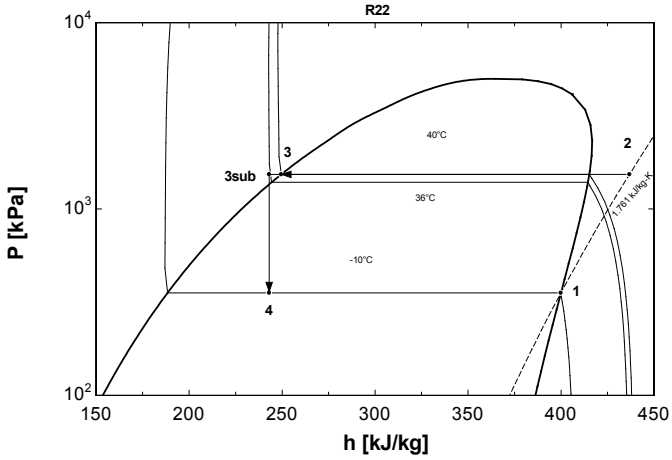

Fig.5 Thermodynamic cycle of the simulated cooling system

Therefore, as a function of different sea water temperature, the refrigerant fluid experiments very different upper pressure working conditions, being a clear example of cycle variations that a marine engineer must be prepared to understand and correct in as much less time as possible.

Consequently, it is essential to teach marine engineers how a thermodynamic cycle works under different design parameters and working conditions, something that cannot be done with current simulators.

Furthermore, most of these simulators need an extraordinary economical investment, in such a way that only a few high education institutions per country can offer them.

C. *Validation Methodology*

The validation methodology employed in this paper is quite similar to the two tests classical methodology employed for other general purpose simulators [7, 8].

The first test, called static test, allows professors to know if a trainee is able to achieve the engine room normal status, like for example, get the main engine ready to start.

The second type of test, called dynamic test, allows professors to get a continue registration and analysis of the user behavior and check the trainee's ability to follow random changes, like for example, a system failure.

A very simple classification of operator errors includes fatal, serious and minor errors: fatal errors cause a ship to be out of operation for a long time, serious errors cause serious damage to the engine room in a near future and, finally, minor errors are without any direct consequence in an observed situation, but have potential to cause serious problem if the situation alters.

In this research work, a slightly different methodology was employed as in order to achieve an in-depth knowledge of the system working with new parameters that have never been analyzed before.

As a consequence, all 50 students learned the theory of frigorific cycles in classrooms and went to the real frigorific cycle placed in the laboratory (Figure 3), where they could recognize each of the components of the cycle and its working conditions.

In a first state, 25 students answered tests about the system's behavior, and in a second state, the resting 25 students employed the simulator to understand the real behavior of the cycle under different design and operation conditions and answered the same test. Finally, both results were compared, as explained in the Results and Discussion section.

D. *Simulator Main Screen*

Figure 6 shows the main screen of the developed simulator, where can be seen a general block diagram of the simulated system, showing real images of each component:

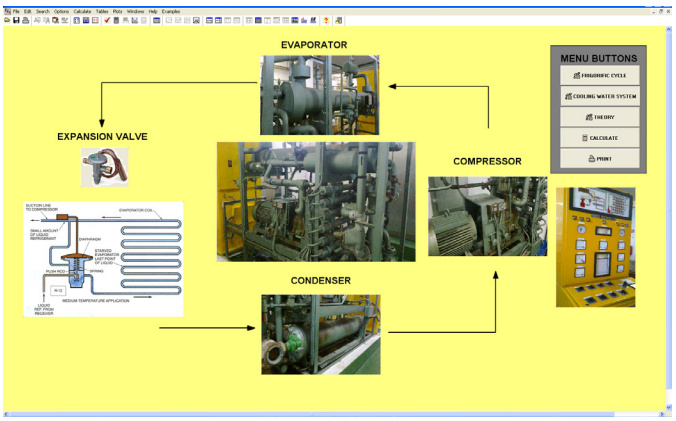

Fig. 6 Simulator Main Screen

E. *Cooling System Simulator*

In the simulated frigorific cycle, each of the components employed in the real laboratory were represented and different input parameters can be adjusted by students to obtain a different Coefficient of Performance (COP), as shown in Figure 7:

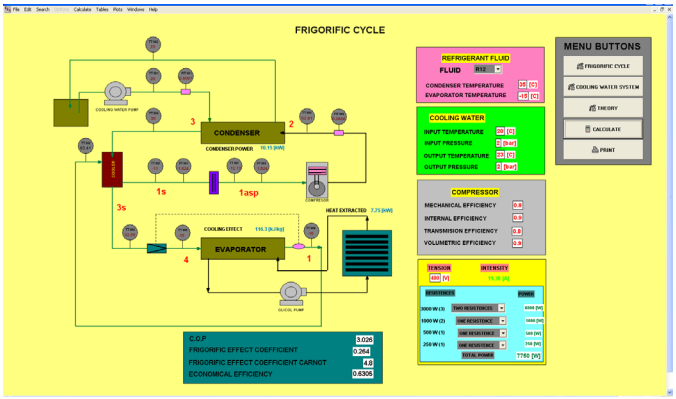

Fig. 7 Frigorific cycle in the developed simulator

In contrast with the previously analyzed simulators, it is possible to change the refrigerant fluid between R12, R22, and R134a, and also it is possible to define the condenser temperature, the evaporator temperature, the input and output temperature, and the pressure of cooling water.

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Furthermore, it is possible to define different compressor efficiency and the heat to be evacuated by the frigorific cycle that is obtained in the real laboratory by electrical resistances.

The developed simulator allows also to represent and modify the cooling water system, being possible to adjust sub-cooling level, super-heating level and the pressure drop in the circuit, between other parameters, as can be seen in Figure 8:

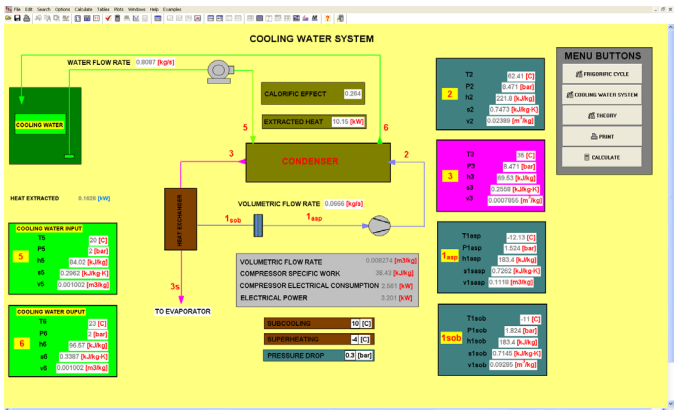

Fig.8 Cooling water system in the developed simulator

F. Simulator Developing Process Analysis

In order to analyze the effort needed to develop this simulator, it has been divided in two states: in the first state, it was necessary approximately 12 hours to mathematically solve the cycle based on static parameters in the programming section.

It required considerably more time than in a usual thermodynamic problem, as selected cooling cycle presented more complex parameters like sub-cooling and superheating.

At the same time, more programming algorithms were needed to simulate the heat to be removed by the cooling systems obtained by choosing the number of electrical resistances that are activated.

Once the mathematical code was implemented, each screen was developed in reduced time, being the input variables of the code added to the corresponding simulator screen.

A similar effort was needed for adding the results labels, consuming around 3 hours for these processes.

In total, about 15 hours were needed to develop the basic simulator and test it, even when in accordance with the level of complexity of different screen, a slightly higher number of hours could be expected, showing the extraordinary power of EES programming code.

IV. Results and Discussion

As observed before, to validate the learning results, the previously mentioned test was filled by 25 students and another 25 students answered the same test after training with the simulator.

In particular, these students were trained with the simulator on their own computers 1 hour before answering the test.

The average mark of each test is represented in Figure 9, showing a clear displacement of marks towards a higher value when the students learned the process using the simulator:

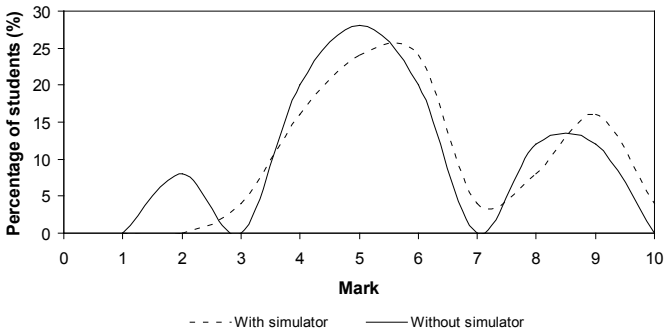

Fig. 9 Average marks in each test

As can be observed, with the simulator there were fewer students with lower punctuation as 5 points (the minimum mark to pass the test) and more students had marks of 9 points.

The average results over the 5 more interesting questions of the test (Table 4), that were specifically designed to note the difference with previous teaching methods are presented in Figure 10:

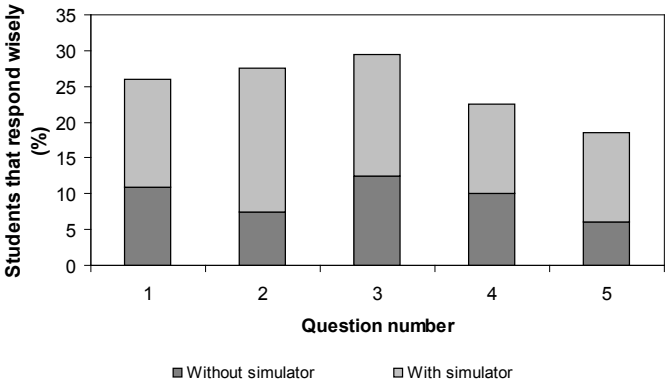

Fig. 10 Main test results before and after simulator

Table 4. Relevant questions to test students understanding of frigorific cycle

Number	Question	True	False
1	If the evaporator pressure is higher and compressor's work is constant, the COP increase		
2	If we change the frigorific fluid R22 by R134a, the COP increase		
3	If the condenser pressure is lower and compressor's work is constant, the COP increase		
4	If the evaporator pressure is higher and compressor's work is constant, the COP increase		
5	If sub-cooling level increases, the quality at the end of expansion process is higher		

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As seen in Figure 10, there was a clear improvement in the learning process when the simulator was employed. Despite the fact that, in question 3, higher number of wise responses were obtained; it is in questions 2 and 5 where more students could improve their answers.

In particular, there was a clear enhancement when responding to question 2 due to the difficulty of understanding frigorific fluid state curve, considering that the COP cannot be predicted easily. Furthermore, this question cannot be understood and answered without using simulators as the main equations are too complicated to be mentally solved.

On the other hand, other questions like, for example, "the effect of pressure over the evaporator and condenser under a constant compressor's work" can be easily answered mentally once these effects were observed in simulations or in problems solved manually.

The main advantage of simulators is the lack of need of doing the same problem two times to note the difference in behavior and the need of less time to solve it.

Finally, despite the fact that there was a clear enhancement in some questions than in others, a clear improvement in all the questions was observed once students employed the simulator.

V. Conclusions

As mentioned before, despite the fact that expensive and detailed simulators for the main engine of a ship are available, there is a lack of simulators related with another aspects of the equipment and systems of a ship that belong to the competencies of marine engineers in accordance with STCW convention.

In this sense, in the present research work, it has been developed a new methodology to design fast simulators adjusted to real installations, like laboratories, which can clearly help to teach new concepts, showing clear advantages with respect the classical simulators:

1) Simulators were developed with EES software, which allows to generate an executable file and can be developed and improved by professors in a suitable time.
2) A higher flexibility during simulator design was obtained considering that, for example, all programming variables can be selected to be added in the synoptic screen.
3) The simulator can be developed in accordance with the exact working conditions of a real installation in contrast to simple generic simulators.
4) This procedure can be employed for the design and implementation of power and cooling systems to train different operators prior to their working in a real power station.
5) There is no need of addition of more modules and expensive components. Thus, as a standalone executable file was developed, it can be run in computers without EES software. In consequence, it is a very economical option for engineering training courses and companies training sections.

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Online courses. A study on demand and offer content

Mirela-Catrinel Voicu

***Abstract*—**The evolution of IT technologies over the last years, especially in the cloud computing area, has also marked unprecedented evolutions in online learning domains. Companies, schools, universities use online trainings and courses more frequently in order to carry out training and education activities.

Beside specialized companies and institutions, we also have different vendors of online courses. These offers refer to a very large set of topics such as: foreign languages, informatics, music, soft skills, etc. In this paper we present a study focused on online learning as a subject between demand and offer content. We study the demand for online courses about *data structures*, *JavaScript* and *HTML5* and we present some *JavaScript* and *HTML5* tools which improve the quality of *data structure* algorithm presentations.

***Keywords*—**Online learning, Google AdWords, data structures, JavaScript, HTML5

I. Introduction

Web and mobile technologies are currently undergoing an impressive evolution. To be well documented on different topics, we must study continuously. We can find a lot of information on our topics of interest on the *Internet*. For example, the website http://developer.android.com/develop/index.html provides the content which must be known by any person who want to develop *Android* apps. Also, on the *Internet* we can find many other websites providing important information on the same subject. *YouTube* is already the largest source of online courses in video format in the world.

Many books or ebooks (see for example www.amazon.com) can help us gain new knowledge in our areas of interest.

Also, a good source of information is given by different online courses (see [2], [4]). In most cases, online courses are found in the context of an online business. For a business, we must consider the online courses in terms of customers (students), competition, marketing tools, etc. Given these facts, we must improve the quality of online course presentations, as dictated by the emergence of new technologies.

In this paper we present a way in which we can improve the presentation of data structure algorithms (see [5], [3]), using *JavaScript* (see [1]) and *HTML5* (see [6]) tools. In the *Section 2*, we carry out a study to find out if there are people interested in these subjects of study.

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We present four very well known algorithms: calculating, minimum element in the array, the sum of array elements, sorting the elements of a vector and creating a singly-linked list. To improve the presentation of these algorithms, we present animations (using *JavaScript* and *HTML5* code), which aim to improve teaching activities in the context of different environments, such as: websites, mobile apps or offline applications. We present these animations in the *Section 3*.

II. Identifying interest for certain subjects of study

In this section we are focused on sounding the interest of people in the following three topics: *data structures*, *JavaScript* and *HTML5*.

Using, for example, the keyword planner from *Google AdWords* account, we obtain the images presented in *Figure 1*, which refer to Google searches, the following keywords: *data structures* (top image), *JavaScript* (center image), and *HTML5* (bottom image).

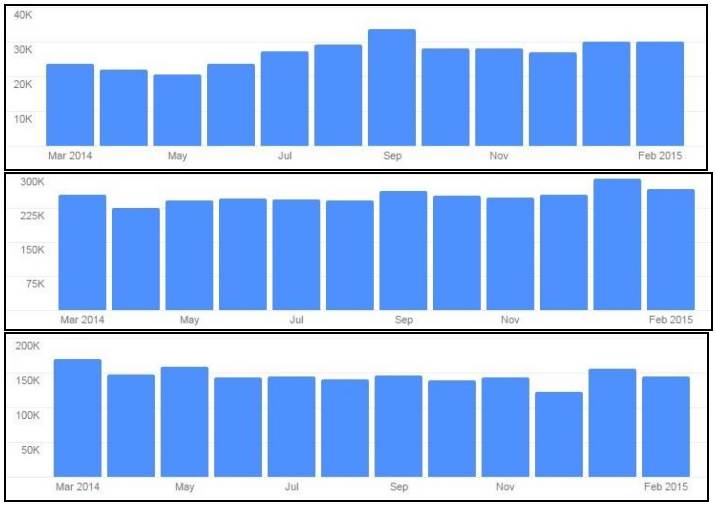

Fig.1 Searches on Google for *data structures*, *JavaScript* and *HTML5* keywords, in the context of learning

To find these results, using the *keyword planner tool*, we made the following settings: for *Your product or service* we specified: *data structures*, *JavaScript*, respectively *HTML5*. For *Your landing page* we specified our website http://onlearningtrends.com/co/ (if we chose another website,

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the results can be little bit different, according to the content of the website which was specified). We chose *Jobs & Education* for *Your product category*. For *Targeting* we selected *All locations*. For language we specified *All languages*.

The people who know the *Google AdWords* tools very well, will probably be surprised by my choice. It is well known that for *Google* advertising, generally for location, we do not chose all locations, and that the languages are selected according to the specified locations. For example, in general, if the location is *France* for language we chose *French*, etc. In the cases of our study, this rule can also be applied, but we have noticed that, in terms of informatics, the results can be significantly different if we chose *All languages*. For example, if the keyword is *HTML5*, we can observe that for the location *France* and the language *French*, we find fewer results than if we were to choose *English* or *All languages*. This is only an example, but we have noticed this aspect in the case of many informatics terms (which are the same in many languages).

Also, to obtain representative results, the landing page must be very suggestive according to the used keywords.

Keyword (by relevance)	Avg. monthly searches	Competition	Suggested bid	
javascript jobs	720000	Low	$2.60	
javascript online course	480000	Medium	$10.02	1
javascript courses	390000	Medium	$9.25	1
online javascript course	210000	High	$6.30	1
javascript tutor	140000	High	$5.16	1
programming languages	40500	Low	$0.68	1
learn java	33100	Low	$3.70	
javascript interview questions	18100	Low	$3.51	1
java tutorials	18100	Low	$2.49	
learn javascript	14800	Low	$5.41	1
learn php	14800	Low	$3.72	
java basics	12100	Low	$0.99	
learn programming	8100	Low	$5.82	
java developer	8100	Medium	$4.99	
learning java	8100	Low	$3.59	
php programming	6600	Medium	$3.64	
how to learn java	5400	Low	$2.73	
learning javascript	4400	Low	$5.03	1

Table 1: Average monthly searches for the keyword *JavaScript*

In *Table 1*, we present only 18 keywords (from a list of 36 terms) provided by the *keyword planner*. We have used the value 1, in the rows which correspond to our goal. We have ordered the list decreasingly according to the average monthly searches. In *Table 1* we can also observe the kind of competition and the suggested bid. Similar analyses are made for the terms such as *data structures* and *HTML5*.

From *Figure 1*, and *Table 1* we have seen that there are tools which help us know if there is an interest for studying in the direction proposed by us. Also, using *Google Trends* we can find out information on the locations of the possible customers.

Google AdWords is not the only tool that can provide information on possible customers, but it is a very important one. In this section we wanted to show that information about potential customers is very important, and that it can be idenified.

III. Data Structures Applications

Data structures represent a complex and very important part of programming learning. There are many books, websites, online courses, offline courses etc., on these topics.

In this section, our goal is to present how *JavaScript* and *HTML5* tools can help us improve the data structures presentation. We chose four well known algorithms and we present an animation for each of them.

In this first application we present a way in which we can illustrate the algorithm with which we calculate the minimum element in the array (using *JavaScript* code for animation).

In *Figure 2*, we have three images. In the first image we can view the vector with its elements, corresponding to each *i* component. First, the minimum (*vMin* variable) is initialized with the first vector component - *a[1]*. In a *for* loop, for each *i* component of the vector, we compare *a[i]* with the value *vMin*. In the second image from *Figure 2*, we can notice the following things: until *i=6*, the minimum in the array was the value 2. For *i=6*, we compare the element *a[i]* (which has the value 1) with *vMin*, and we find a new minimum, which is 1 (we display this value in the column named *Min*). This happens for each *i* component of the array, and in this way, in the last image from *Figure 2*, we obtain the minimum element in the array. In the column *a[i]* we can observe the values which were temporary minimum values.

Now, we present the code which is used to obtain the animation from *Figure 2*:

```
<html><head><title>Vector - the sum of elements</title>
<SCRIPT language="JavaScript">

We read the number of array elements.
n=eval(prompt("number of elements","5"));
b=[];

We read the array elements.
for(i=1;i<=n;i++)
  b[i]=eval(prompt("value of  a","0"));
```

With the function *f1()* we calculate the minimum element in the array, and we display, along the *for* loop, the following information: the loop counter (the variable *i*), each elements *a[i]*, and the minimum detected until the each *i* repetition of the loop.

```
function f1(){
  vMin=b[1];   text="";
  for(i=1;i<=n;i++){
```

At this step, we compare the minimum *vMin*, with the *a[i]* element. To emphasize the value which is studied, we make a red 1 button (see in *Figure 2*, the middle image, line *i=6*). If we find a new minimum, we change the color button to green, otherwise we change it to blue.

```
  a= document.getElementById("b"+i);
  a.style.background="red";
  alert("ok");
  if(vMin>b[i]){
    vMin=b[i];
    a.style.background="green";
  } else
    a.style.background="lightsteelblue";
  a= document.getElementById("n"+i);
  a.style.background="lightsteelblue";
  a= document.getElementById("s"+i);
  a.style.background="lightsteelblue";
  a.value=vMin;
  alert("ok");
 }}
```

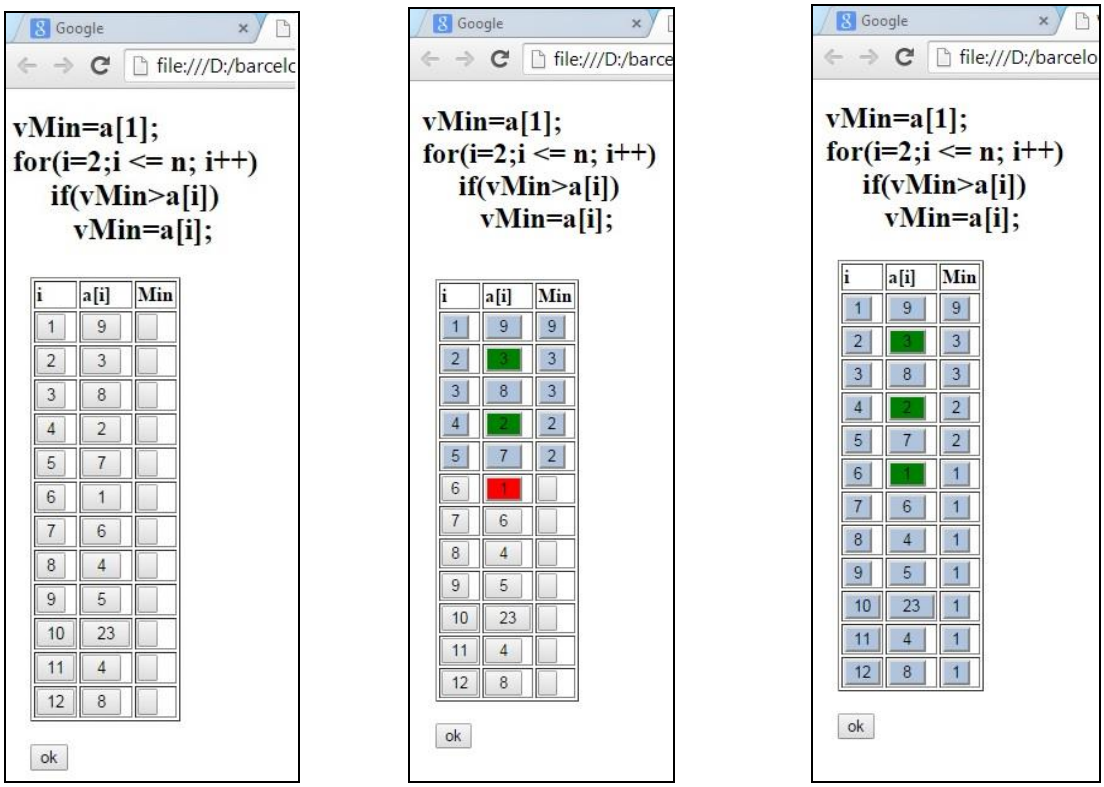

Fig. 2 Animation used to understand the algorithm for calculating the minimum element in the array

Here, we display the information.

```
document.write("<br><br><br><br><br><br><br><br>");
document.write("<b><font size=5>vMin=a[1]; <br>");
document.write("for(i=2;i <= n; i++) <br>   ");
document.write("if(vMin>a[i])<br>   ");
document.write("vMin=a[i]; </font></b><br><br><br>");
document.write("<form name=\"form1\">");
document.write("<table  border=1><tr><td><b>i</b></td>");
document.write("<td><b>a[i]</b></td><td><b>Min</b>");
document.write("</td></tr>");
for(i=1;i<=n;i++){
 document.write("<tr><td><input type=\"button\"  id=\"n"+);
document.write("i+"\"value=\""+i+"\"></td><td><input type);
document.write("=\"button\" id=\"b"+i+"\" value=\" "+b[i]+");
document.write("\"></td><td><input  type=\"button\"  id=");
document.write("\"s"+ i+"\"  value=\"\"></td></tr>");
}
document.write("</table><br>");
document.write("<input  type=\"button\"  name=\"button1\");
document.write("value=\"ok\" onclick=\"f1()\"></form>");
  </script></head><body></body></html>.
```

Another known algorithm, used for vectors, is the one which calculates the sum of array elements. In the *Figure 3*, we illustrate this algorithm in the following way: for each *i* counter of the *for* loop, we display the value of *i*, of *a[i]*, the elements which provide the temporary sum calculated until step *i*, and the value of this sum.

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Now, we present the code which is used to obtain the animation from *Figure 3*:

```
<html><head>
<title>Vector - the sum of elements</title>
<SCRIPT language="JavaScript">
n=eval(prompt("number of elements ","5"));
if(n>12) n=12;
b=[];
for(i=1;i<=n;i++)
 b[i]=eval(prompt("value of  a ","0"));
```

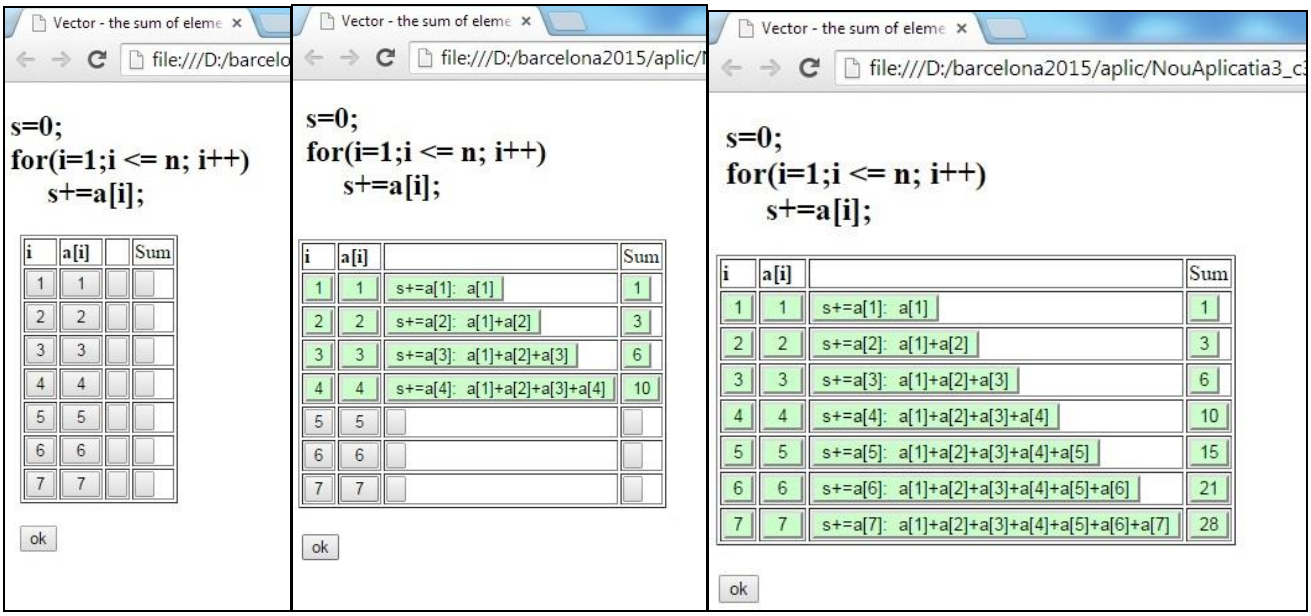

Fig. 3 Animation used to understand the algorithm for calculating the sum of array elements

With the function *f1()*, we calculate the sum of array elements, and we display, along the *for* loop, the following information: the loop counter (the variable *i*), each elements *a[i]*, the sum until step *i*, and the elements used to calculate this sum. Each calculated line is colored with green.

```
function f1(){
 s=0;   text="";
 for(i=1;i<=n;i++){
  s+=b[i];
  a= document.getElementById("n"+i);
  a.style.background="green";
  a= document.getElementById("b"+i);
  a.style.background="green";
  a= document.getElementById("s"+i);
  a.style.background="green";
  if(i==1)
   text+="a["+i+"]";
  else
   text+="+a["+i+"]";
  a.value="s+=a["+i+"]:  "+text;
  a= document.getElementById("sv"+i);
  a.style.background="green";
  a.value=s;
  alert("ok");
 }
}
```

For displaying the information in the page, we use the same kind of code as the one presented for calculating the minimum element in the array.

There are a lot of popular algorithms for sorting vector elements. At this stage we want to demonstrate how we can use *JavaScript* tools to animate the algorithm presentation. Here, we choose the *selection sort* algorithm for presentation.

For each *i* with value from the first index to the last -1, the algorithm works by finding the smallest element in the vector, exchanging it with the *a[i]* element. (see *Figure 4*).

The code used is the following:

```
<html><head><title>Sorting</title>
<SCRIPT language="JavaScript">
n=eval(prompt("number of elements","5"));
if(n>12) n=12;
b=[];
for(i=1;i<=n;i++)
 b[i]=eval(prompt("value of  a ","0"));
```

With the function *f1()* we sort the vector elements. At each repetition of the loop, we emphasize the elements which will be changed (the buttons are coloured red). After changing the elements, the components which were ordered, have the buttons coloured green. In the third column we display, on buttons components, a number of lines corresponding to the value of vector elements. This helps us to observe easily that the values are ordered.

```
function f1(){
  for(i=1;i<=n-1;i++){
     x=b[i];b_min=i;
     for(j=i+1;j<=n;j++)
        if(x>b[j]){x=b[j];b_min=j;}
```

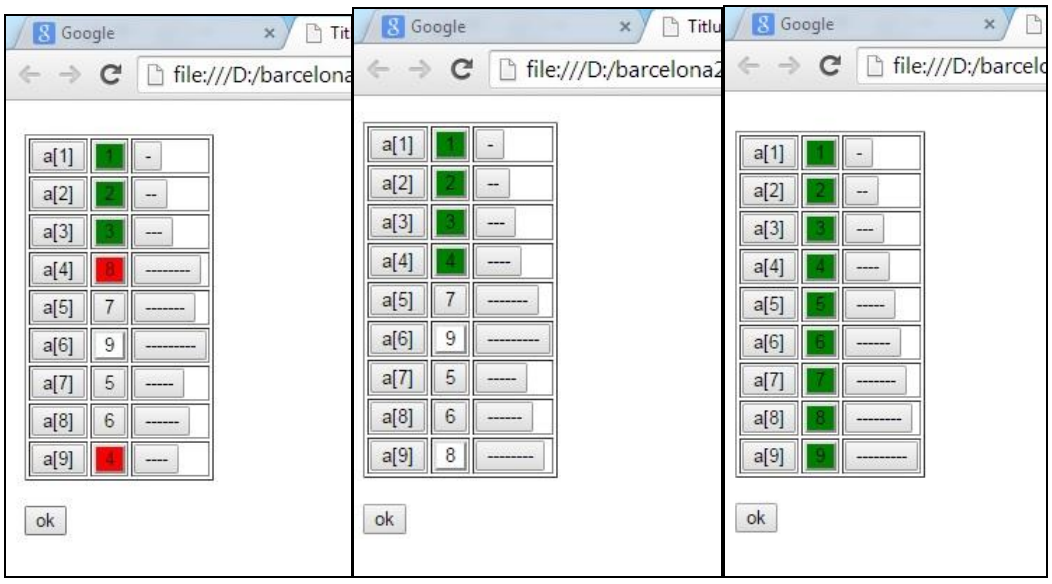

Fig. 4 Animation used to understand the sorting of array elements

```
  a= document.getElementById("b"+i);
  a.style.background="red";
  a= document.getElementById("b"+b_min);
  a.style.background="red";
  b[b_min]=b[i];
  b[i]=x;
  a= document.getElementById("b"+b_min);
  a.style.background="white";
  a= document.getElementById("b"+i);
  a.style.background="green";
  for(l=1;l<=n;l++){
  textL=""
    a= document.getElementById("b"+l);
    a.value=b[l];
 for(j=1;j<=b[l];j++)
  textL+="-"
 a= document.getElementById("bl"+l);
    a.value=textL;
  }
 }
 a= document.getElementById("b"+n);
 a.style.background="green";
}
```

For displaying the information in the page, we use the same code as the one presented for calculating the minimum element in the array.

In this last example, we present a way in which we animate the following algorithm: we create a linked list, inserting a new node at beginning of the list. In this example we use an *HTML5 Canvas* object. Drawing rectangles and lines (arrows), we can display the way in which a singly-linked list is created, using the technique of inserting a new node at the list beginning.

```
<HTML><HEAD><TITLE> PRIMUL SCRIPT </TITLE>
<SCRIPT language="JavaScript">
```

With the function *node*, we describe the structure of the list nodes.

```
function nod(x,y){
 this.x=x;  this.y=y;  this.next=null;
}
```

Using the function *inserting*, we insert a new node at the list beginning.

```
function inserting(){
 x=eval(prompt("value of x",""));
 y=eval(prompt("value of y",""));
 p=new nod(x,y);  p.next=first;  first=p;
}
```

In the function *displaying*, we cross the linked list; in the variable *s* we save the values which are displayed in rectangles (nodes); and we use a *HTML5 canvas* object, on which we display the list.

```
function displaying(){
context.clearRect(0, 0, canvas.width, canvas.height);
 q=first;  s="";l=125;b=130;i=0;c=[];
 while(q!=null){
  s=s+" node: q.x="+q.x+" q.y="+q.y+"<br>";    i++;

Here we draw the rectangles (the list nodes).
   context.fillStyle = 'white';    context.rect(l, 20, 130, 60);
   context.fill(); context.lineWidth = 3;
   context.fillStyle = 'black'; context.font = 'bold 20pt Calibri';

if(q.next==null)
    a=q.x + " | "+q.y + " | null";
   else
    a=q.x + " | "+q.y + " |   ";
   c[i]=a;  context.strokeStyle = 'black';  context.stroke();
l+=200; q=q.next;
  }
```

```
d1=225; d2=325;d3=310;
for(j=1;j<=i;j++){
 context.fillText(c[j],b,60);
```

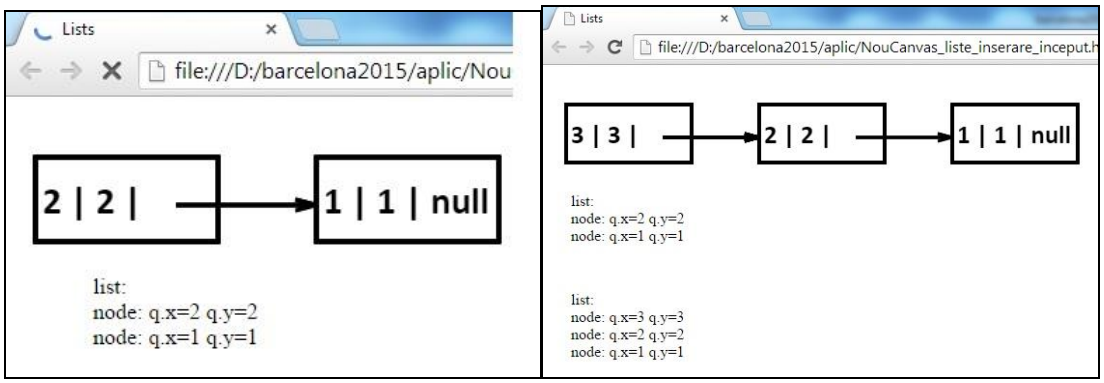

Fig. 4 Animation used to understand the creation of linked lists

```
 b+=200;
  We draw the arrows for the linked list.
 if(j<i){
  context.moveTo(d1, 54); context.lineTo(d2, 54);
  context.stroke(); context.moveTo(d3, 50);
  context.lineTo(d2, 54); context.stroke();
  context.moveTo(d3, 58); context.lineTo(d2, 54);
  context.stroke();
  }
   d1+=200;d2+=200;d3+=200;
  }
document.write("<br><br><br><br><br>list: <br>"+s);
  }
document.write("<canvas id=\"myCanvas\" width=\"1300\"");
document.write("height=\"300\"></canvas>");
  canvas = document.getElementById("myCanvas");
  context = canvas.getContext("2d"); first=null;
  c=prompt("i - inserting a new node, a - displaying the
list","");
  while((c.toLowerCase()=="i")||(c.toLowerCase()=="a")){
   if(c.toLowerCase()=="i")
    inserting();
   else
    displaying();

   c=prompt("i - inserting nod, a - displaying the list","");
  }
  </SCRIPT></HEAD>
<BODY></BODY></HTML>
```

IV. Conclusion

The animations presented in *Section 3* are not unique. We can build other different animations from the same algorithms. Our work only intends to show that the new technologies come equipped with many tools which can help teaching in online environments. However, these techniques can be used in the same way in websites as in mobile apps. *JavaScript* and *HTML5* (and in almost cases, also *CSS*) are generally dedicated to improving the presentation quality of websites or mobile applications, and the online learning is well rooted in this direction of development.

In *Section 2* we have seen that such a study (including data structures, *JavaScript* and *HTML5*) makes sense, and we have seen how we can obtain information on possible customers.

In *Section 3* we have presented a study on algorithms from the data structures area, improved by the use animations. We can choose in the same way any kind of lessons, from different learning areas.

Finally, we want to point out that in the online environment, the quality of online courses presentation must be a goal.

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Classification of Student's Belief based on their Technology Readiness for an E-learning System

Adel Bessadok

***Abstract*—**This paper deals with the study of the readiness of students for an e-learning system as emerged learning technology. We analyze, based on the Technology readiness index (TRI) dimensions- innovation, optimism, discomfort and insecurity- of Parsuraman, the most influential factor on students readiness by classify students beliefs. A survey questionnaire was conducted to collect data from 400 participants. Confirmatory Factor Analysis (CFA) and Measurement Model have deployed to analyze the data. Classification has used to validate the research model. What comes out from this preliminary study is that despite their optimism the students show their reticence on e-learning system readiness.

***Keywords*—**E-learning, Technology Readiness Index, Classification, Measurement Model.

I. Introduction

THE E-learning system viewed as web-based education is becoming an increasingly widespread approach in higher education institutions all over the world and in particular Blended learning ([10],[16]), which combines the strength of face-to-face and technology-enhanced learning, is ever more being seen as one of the most important vehicles for education reform today[17].Globally, higher education institutions have invested substantial resources in e-learning system.

As the adoption of e-learning system is ever increasing rapidly worldwide, Saudi Arabia universities are at the threshold of implementation of such system. Umm al-qura University ,as an example, have implemented recently a Desire To Learn (D2L) as Learning Management System (LMS) to support both distance and traditional learning and encouraging their academics to use e-learning system by providing a multi-levels training for teachers as well for students for a continuous education development. This new paradigm transfers education from teacher-centered to student-centered [12]. Even so, it is obvious that such a change does not take place overnight ([11],[2]). In fact, having an e-learning system on campus will not automatically lead to its use and the benefit of such system will not be maximized unless learners use it [19]. Therefore, the availability of a technological infrastructure is not sufficient to predict the readiness or no for the use of e-learning system as a new emerged technology, either on the side of the teachers or on that of the students.

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This research took as its theoretical framework the Technology Readiness Index (TRI) scales of Parasuraman and Rockbridge Associates Inc (1999), with the aim of assessing readiness of students use of e-learning system technology in an higher education. Such models have been the object of research scrutiny since publication of the original studies TRI by Parasuraman [14] and Parasuraman and Colby [15]. TRI model test results can be generalized for contexts such as insurance services, and industrial equipment [20]. Confirmatory factorial analysis (CFA) was using to validate the instrument and the results obtained had indicated that TRI lead to differentiate between users and non-users of such new technological products or services, and may help to predict adoption of these products or services [18].

Although the TRI has been extensively tested and validated among users in the business world, its application in higher education is limited and more precisely in Saudi Arabian universities.

We carried out this research study for the case of users and non-users of e-learning system in three stages: (1) firstly, we analyze the correspondence between TRI dimensions to assess the state of technology readiness of Umm al-qura university students.; (2) next, we evaluate the main influence factor that might help for understanding the increase or the suppression of the technology readiness among the surveyed students. ; (3) finally we validate the results of the first and second stage by classifying students into different categories to explain the tendency beliefs of students in their readiness about e-learning system .To perform stage 1, we carried out a CFA , with results pointing to differences in terms of optimism and insecurity between users and non-users of e-learning system. In stage 2, we carried out a statistical analysis using correlation with real observations to reach the most accurate estimation for the dominant factor. To validate the research results, we conducted in stage 3 a classification approach using K-means technique.

The remaining part of the paper approaches the following subjects: in section II we introduce the TRI by presenting the literature review, the hypothesis and the segmentation of the technology readiness dimensions. In section III we present the

research model upon which we based our research arguments pertaining to the most influencing factor that affect students readiness for e-learning system technology. Section IV is devoted to the methodology proposed for conducting the present study. The analysis and the results of the survey are presented in section V and finally in section VI we did a synthesis of the concluding remarks of the paper is laid out.

II. Technology Readiness index

A. Literature Review

Previous studies have shown that the combination between positive and negative beliefs concerning technology underlies the field of technology readiness [4],[13] and [15]. The term Technology Readiness Index (TRI) was first introduced in year 2000 by Parasuraman and was published in the Journal of Service Research [14]. Parasurman propose to measure the "*people's propensity to embrace and use new technologies for accomplishing goals in home life and at work*" (Parasuraman, 2000, p. 308) and from that time the TRI has become a widely accepted metric for studying the behavior process behind the adoption of technological products and services. However, TRI gives us an idea about person's beliefs and not person's competence using new technology [21]. As multiple-item scale, the TRI consisted of a 36 questions devoted to measuring "technology readiness". The 36-item scale was composed of four component dimensions of beliefs related to technology that influence a personal's level of technology readiness. These beliefs assign a person's willingness to interact with new technology [15]. Of the four dimensions, two are contributors and two are inhibitors of technology adoption. The contributors are:

- **Optimism** It describes the expecting from the positive pertinence of technology.
- **Innovativeness** It is about the authority of using technology.

The inhibitors are:

- **Discomfort** It is the doubt about the guarantee that concerns ordinary people experience with technology.
- **Insecurity** It is the risk that people may have with technology-based transactions.

As contributors, optimism and innovativeness are the locomotive of technology readiness. In fact, a high score measured on these dimensions will generally enlarge the technology readiness. In contrast, discomfort and insecurity prevent or delay, people's natural tendency to use new technology. Thereby, a high score measured on these dimensions will decrease the entire technology readiness [14]. The four dimensions as shown in figure 1 are fairly independent of each other, therefore, an individual could accommodate both contributor and inhibitor feelings towards technology [15].

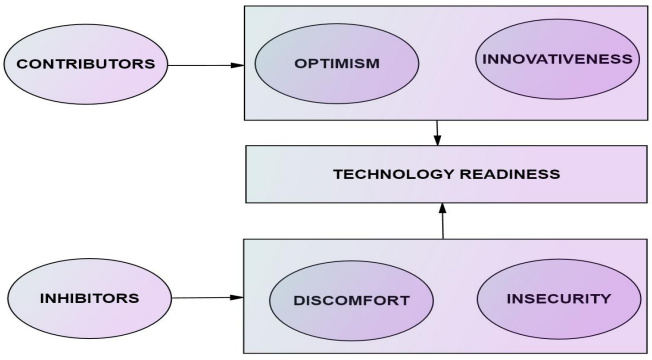

Figure:1 Technology Readiness Index (Parasuraman 2000,p34)

For many years, the TRI has been precious for researchers interesting in social media, mobile access and other technology services. The 36-item scale established by Parasuraman were translated in multiple languages to facilitate their deployment in many countries and have been used in a wide variety of service sectors including education, banking, telecommunications, healthcare, and professional services.

B. Hypothesis

In view of these TRI factors as specific characteristic between technology motivated and non-motivated, as seeing in figure 1, we can consider the following hypotheses.

- **H1**: The optimism factor, defined as a positive vision of technology, and the belief that its greater control, flexibility and efficiency in people's lives, is a differentiating element between motivated and non-motivated of e-learning system.
- **H2**: The innovativeness factor, defined as a tendency to be a pioneer, leader or opinion-former in the use of technology, is a differentiating element between motivated and non-motivated of e-learning system.
- **H3**: The discomfort factor, defined as perception of lack of control over technology and the feeling of being pressured or oppressed by it, is a differentiating element between motivated and non-motivated of e-learning system.
- **H4**: The insecurity factor, defined as distrust of technology and skepticism of one's own abilities to use it appropriately, is a differentiating element between motivated and non-motivated of e-learning system.

C. Clasification

Classification is a meaningful way to capture the complexities of student's beliefs related to the use of new technology. Based on the technology readiness scores, Parasuraman & Colby (2001) specifically, they describe five classes of technology readiness users as following:

- **Explorers**: Who are the first people to adopt technology, who are highly motivated and who are a relatively easy group to attract when a new technology product or service is introduced because they have no fears about it.

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- **Pioneers**: Who are the next to adopt technology, who desire the benefits of new technology by sharing the optimism and innovative views of explorers, but are more realistic about the difficulties and dangers by feeling some discomfort and insecurity.
- **Skeptics**: Who are low motivated and need to be tend to be convinced of the benefits of using the emerging technology.
- **Paranoids**: Who are may find technology interesting, but at the same time they are feeling insecure.
- **Laggards**: Who are the resistant ones possess few motivations toward technology, who are the last to adopt technology unless they are forced to do so.

To summarize all classes, table 1 presents a clear profile of each type of user's beliefs of technology adoption.

Table:1Characteristics of technology classes(Parasuraman and Colby,2001)

	OPTIMISM	INNOVATIVENESS	DISCOMFORT	INSECURITY
EXPLORERS	HIGH	HIGH	LOW	LOW
PIONEERS	HIGH	HIGH	HIGH	HIGH
SKEPTICS	LOW	LOW	LOW	LOW
PARANOIDS	HIGH	LOW	HIGH	HIGH
LAGGARDS	LOW	LOW	HIGH	HIGH

III. Research Model and Hypothesis

The main objective of the study is to determine the dominant factor that have the most influence on the overall TRI change. To understand TRI factors as specific characteristic profile between student's e-learning system readiness and non-readiness, as seen in figure 1, we can established the following hypotheses.

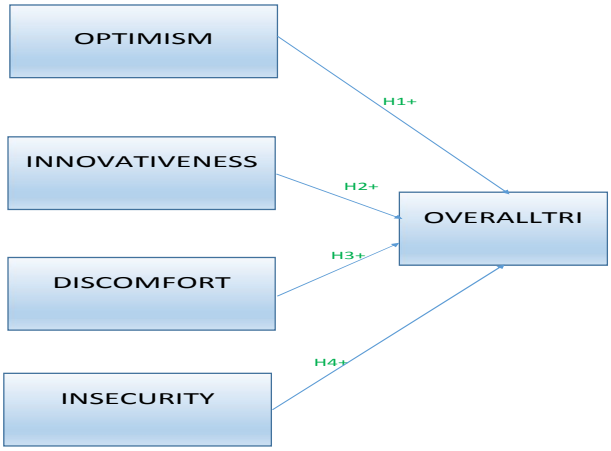

Figure:2 Model Hypothesis

- **H1+**: The Optimism factor, has a positive effect on the student's willingness on the use of e-learning system. The optimism is the most influential factor among all TRI factors.
- **H2+**: The Innovativeness factor, has a positive effect on the student's readiness on the use of e-learning system. The Innovativeness is the most influential factor among all TRI factors.
- **H3+**: The Discomfort factor, has a negative effect on the student's readiness on the use of e-learning system. The Discomfort is the most influential factor among all TRI factors.
- **H4+**: The Insecurity factor, has a negative effect on the student's readiness on the use of e-learning system. The Insecurity is the most influential factor among all TRI factors.

IV. Methodology

A. Sample

The population in the study consists of university students at Umm Al-Qura University's Makkah Campus. Specifically we are interested in five colleges using the most learning management system provided by the university. Participants in this study were 400 non-graduate students attending these five colleges. After pretreatment by eliminating missed responses, the sample obtained composed by 384 students 23% of them were from engineering, 25% from medicine, 12% were from college science, 31% were from administration and 9% were from education. About 46% were male and 54% were female students that it has been respecting approximately the real student who reflected approximately the real student's distribution.

B. Questionnaire

The data for this study were obtained using a questionnaire distributed and collected from students in classrooms. The survey instruments used in this study were Parasuraman's Technology Readiness Index (TRI) (see Appendix 1).
After translation to Arabic, we devote a preface for the questionnaire to explain the objective of the survey by making analogy between e-learning system and technology, the assurance of confidentiality and anonymity of respondents and, the voluntary nature of respondent participation.

C. Measures

The questionnaire was designed to measure the four constructs in the research model comprising the demographic information of the participants. The original technology readiness scale of Parasuraman consists of totally 36 items divided into four dimensions: Optimism (10 items), innovativeness (7 items), discomfort (10 items), and insecurity (9 items). All measures were in the category of self-assessment and each item question was scored on a Likert scale from 1 to 5, with a 1 rating indicating strong disagreement and a 5 rating indicating strong agreement.

V. Data Analysis and Results

Before starting our empirical analysis, we conducted a thorough examination of the data; including checks for missing values, outliers, and characteristics of the variables used in our study.

A. Measurement Model

To identify the underlying structure in the TRI theoretical model data proposed by Parasuraman (figure 1) we deployed

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Confirmatory Factor Analysis (CFA) [8]. However, the big number of items (36 items) composing the questionnaire from one side and the translation of all its items to Arabic from other side; let the answers provided by students less accurate and consequently the number of factors could not be specified appropriately. To increase factor's reliability and to extract the dimensions of each construct of the TRI, Exploratory Factor Analysis (EFA) was conducted for several time to check the consistency of the proposed factor using SPSS 20. During this validation process, from communalities table we remove items with poor factor loadings less than 0.5 [7], that indicate a weak correlation with all other items. Thus, 15 items were excluded from technology readiness index (see appendix 1) and then CFA was carried out using Amos 20 with the maximum likelihood estimation procedure to test the obtained measurement model (figure 3).

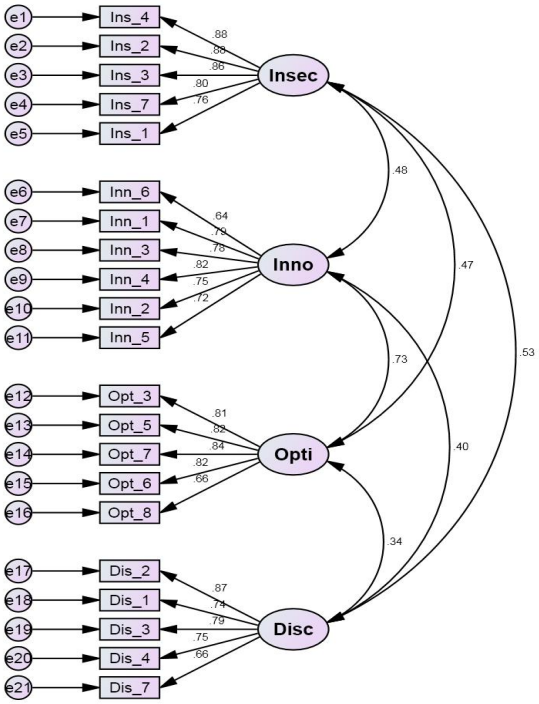

Figure:3 Measurement Model

Factor structure refers to the inter-correlations among variables being tested in EFA. Using the Pattern matrix shown in table 2, we can see that variables group into factors and more precisely, they load onto factors.

	Factor			
	1	2	3	4
Ins_4	.914			
Ins_2	.895			
Ins_3	.868			
Ins_7	.796			
Ins_1	.701			
Inn_6		.798		
Inn_1		.793		
Inn_3		.746		
Inn_4		.725		
Inn_2		.655		
Inn_5		.632		
Opt_3			.858	
Opt_5			.832	
Opt_7			.784	
Opt_6			.753	
Opt_8			.635	
Dis_2				.909
Dis_1				.794
Dis_3				.781
Dis_4				.658
Dis_7				.615

Table:2 Pattern Matrix

B. Reliability and Validity Assessment

The two major import issues in measurement theory are the reliability and validity. The reliability analysis of each factor determines its ability to yield the same results on different situation and validity refers to the measurement of what the factor is supposed to measure [3]. Cronbach's alpha (CA)is the most commonly used as an estimate of reliability that measures internal consistency. We establish convergent validity to show measures that should be related are in reality related. In addition to the internal validity measurement, the convergent validity was examined by Composite Reliability (CR) and by the Average Variance Extracted (AVE) [5]. The recommendation level for the internal consistency reliability is at least should be 0.7 and at least 0.5 for AVE [1].

Table:3 Convergent validity for the measurement model

Construct	Items	CA	CR	AVE
Optimism	5	0.889	0.894	0.629
Innovativeness	6	0.882	0.886	0.565
Discomfort	5	0.873	0.876	0.588
Insecurity	5	0.920	0.921	0.702

As shown in table 3, the Crombach's alpha and Composite Reliability for all constructs are above the acceptable level of 0.7, these measurement indicate a high the internal consistency. In addition, the surpass of all constructs AVE of the level 0.5, provides strong evidence of convergent validity that ensure the real measure of the four TRI dimensions.

C. Discriminant validity

Discriminant validity refers to the extent to which factors are distinct and uncorrelated. Thus, when the correlation between any two constructs is less than the square root of the AVE then the discriminant validity is established [6]. The rule is that variables should relate more strongly to their own factor than to other factor. In the table 4 the items on the diagonal

represent the square roots of the AVE and the others elements are the correlation estimates and it shown that the square root of the AVE was greater than inter-item correlations and that conclude the approved of discriminant validity for each of the items.

Table:4 Discriminant validity for the measurement model

Construct	Optimism	Innovativeness	Discomfort	Insecurity
Optimism	0.793			
Innovativeness	0.733	0.752		
Discomfort	0.344	0.405	0.767	
Insecurity	0.468	0.484	0.530	0.838

D. Overall model fit

The measurement model shown in figure 3 is estimated with maximum likelihood estimation using AMOS 20. All scales remained are subject to CFA test to extract the dimensions of each construct and check the consistency of the proposed factor with actual data. The Pattern matrix illustrates a very clean factors in which convergent and discriminant validity are evident by high loadings within factors great than 0.5 [1], and no cross-loadings between factors as shown in table 2.

Factor analysis results showed 21 items loaded on four Parasuraman TRI factors (figure 3). For measuring the model fit, it is a common practice to deploy a variety of indices [9]. we can classify these indices into three categories as suggested by Hair et al. (2006) [8]. The first is the absolute fit indices category that measure how well the measurement model reproduce the observed data which include the Chi-square statistic, the goodness-of-fit Index (GFI) and the standardized root mean residual (SRMR). The second is the parasimonious fit indices category takes into account the model's complexity which include the Root Mean Square Error of Approximation (RMSEA) and the Adjusted goodness-of-fit Index (AGFI). The third is the incremental fit indices category that asses how well a specified model fit relative to an alternative baseline model which include the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI).

Table 5 shows the recommended critical level of acceptable fit and the result fit indices for the research measurement model. The results shown in table 5 indicates that the measurement model as recommended by the three fit indices categories has an excellent fit.

Table:5 Model fit indices

Fit Index	Recommended Critical value	Result
Chi-square/Degree of Freedom	≤ 3	1.568
GFI	≥ 0.9	0.934
AGIF	≥ 0.8	0.917
CFI	≥ 0.9	0.979
TLI	≥ 0.9	0.976
RMR	≤ 0.08	0.023
RMSEA	≤ 0.05	0.039

E. Hypothesis research results

Table 6 presents the min, max, mean scores and standard deviation of each TRI construct. For each respondent we calculate the overall TRI score as an average of the optimism, innovativeness, discomfort and insecurity after reverse coding the scores on discomfort and insecurity as indicated in table 6 (Parasuraman, 2000, p. 318). For contributor dimension, Innovativeness was rated with highest mean score, 3.938 and the optimism was the next highest mean score, 3.772. However, for the inhibitor dimension, the discomfort and insecurity factors yielded mean values of 2.856 and 3.585 respectively. The overall TRI mean was 3.317 with a standard deviation of 0.296.

Table:6 Summary statistics for TRI

	Min	Max	Mean	Standard deviation
Optimism	1.00	5.00	3.7724	0.61823
Innovativeness	2.00	5.00	3.9384	0.4866
Discomfort	1.00	5.00	2.8568	0.71901
Insecurity	1.00	5.00	3.5854	0.77453
OverallTRI*	2.40	4.50	3.3171	0.29614

**Optimism+Innovativeness+(6-Discomfort)+(6-Insecurity)]/4.*

After the CFA, the second step in this research was the determination of the factor with major effect on the overall TRI. To test the research hypothesis, we calculate the correlation between the Overall TRI and the real TRI factors observation to grasp more accuracy result. The figure 4 describe the influence of each TRI factor to the Overall TRI.

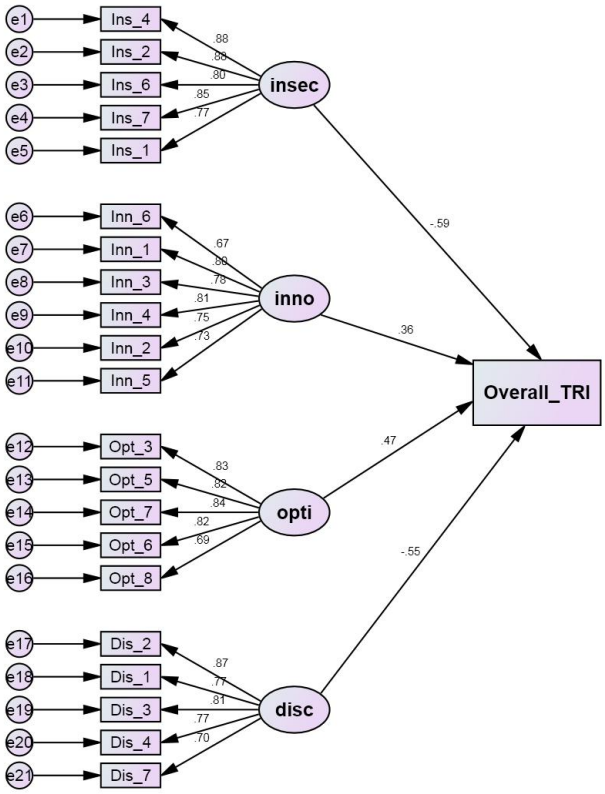

Figure:4 Model Hypothesis Result

F. Results of Technology Readiness Classification

The underlying belief structures of each Technology Readiness cluster may provide a meaningful explanation of why particular student is more(or less) ready for using e-learning system. To obtain distinct groups of students with homogeneous profiles, K-means cluster technique was conducted.

We started by testing the existence of the five classes as presented in table 1. The result confirmed the non-existence of Explorer class and only four of them are remaining. The ANOVA tests indicated that there are a significant differences between the four classes at 0.05 level.

Table:7 Classification result

	%	OPTIMISM	INNOVATIVENESS	DISCOMFORT	INSECURITY
PIONEERS	32.81	(H) 4.17	(H) 3.28	(H) 3.54	(H) 4.17
SKEPTICS	15.89	(L) 3.58	(L) 3.76	(L) 2.10	(L) 2.37
PARANOIDS	40.11	(H) 3.83	(L) 3.91	(H) 2.67	(H) 3.72
LAGGARDS	11.19	(L) 2.70	(L) 3.26	(H) 2.61	(H) 3.08

VI. Discussion and conclusion

From the results obtained in the present study, one can state that the surveyed students are fairly ready for an e-learning system technology. In fact, the table 6 shows that the overall TRI, 3.31, is around the average of Likert scale deployed in this study. Table 4 shows that the correlation between optimism and innovativeness, 0.733, and between discomfort and insecurity, 0.53, are the highest correlation amongst all TRI factors. This result is predictable because the pairs of factors defined respectively the contributors and inhibitors which describe the readiness of students to use the e-learning system technology. To determine the main factor that influence the overall TRI, one can distinguish from figure 4 that the inhibitors factors shown to be more positive with absolute value (0.59; 0.55) in relation to technology than the contributors ones (0.47; 0.36). This meant that despite their belief that technology may offer efficiency and authority in their studies, students in Umm al-qura university are still reticent about the use e-learning system. However, the survey found that the technology readiness varies from student to another. The last result was validate and confirmed in table 7, were we obtained four student's belief classes. There is no Explorers class found that indicated the non exist of student who is highly motivated and fearless to try e-learning system technology. A small percentage of students survey, 11.19 %, they belong to the class of laggards who are the resistant ones and they may never use the e-learning system unless they are forced to do so. Also a relatively small class of the respondents students were skeptics, 15.89 %, who are no highly motivated nor highly resistant to use of e-learning system and but they need to be convinced of the benefit of the emerged e-learning system. The majority of students are belong to the class of Paranoids (40.11) %, who were convinced of the benefits of the e-learning system technology but were preoccupied about the imminent risks and obstacles of technology adoption. The second considerable class is the Pioneers (32.81) %, in which students have an envy to procure the benefits of the new technology but were more practical about difficulties and obstacles involved. Pioneers need help in making the technology work for them and require some degree of assurance. In fact, as shown in table 7, 84.11 % of the students manifested the presence of high score in insecurity and discomfort about technology and we can conclude that the students of Umm al-qura university feel insecure and this is the main factor that explain their reticence about the use of e-learning system. To remedy to this situation we need to reassure the students by encourage them to participate in the training programs provided by university where they can be more awareness and confident about the e-learning system.

The study was limited to a relatively small sample size according to the recent implementation of the e-learning system in the university, nonetheless care should be taken into account in interpreting and generalizing the reached results.
For future research, comparative studies could be conducted on other Saudi Arabia university students to have a clear vision about their tendency to embrace the e-learning system. Also, an interesting study could take in consideration more than the student's belief but also the acceptance and the practice of the use of an e-learning system for students as well for teachers.

Appendix 1

Optimism	
Opt_1*	Technology gives more control over their daily lives
Opt_2*	Products and services that use the newest technologies are much more convenient to use
Opt_3	You like the idea of doing business via computers because you are not limited to regular business hours
Opt_4*	You prefer to use the most advanced technology available
Opt_5	You like computer programs that allow you to tailor things to fit your own needs
Opt_6	Technology makes you more efficient in your occupation
Opt_7	You find new technologies to be mentally stimulating
Opt_8	Technology gives you more freedom of mobility
Opt_9*	Learning about technology can be as rewarding as the technology itself\\
Opt_10*	You feel confident that machines will follow through with what you instructed them to do
Innovativeness	
Inn_1	Other people come to you for advice on new technologies
Inn_2	It seems your friends are learning more about the newest technologies than you are [reverse scored]\\
Inn_3	In general, you are among the first in your circle of friends to acquire new technology when it appears
Inn_4	You can usually figure out new high-tech products and services without help from others
Inn_5	You keep up with the latest technological developments in your areas of interest
Inn_6	You enjoy the challenge of figuring out high-tech gadgets
Inn_7*	You find you have fewer problems than other people in making technology work for you
Discomfort	
Dis_1	Technical support lines are not helpful because they do not explain things in terms you understand
Dis_2	Sometimes, you think that technology systems are not designed for use by ordinary people
Dis_3	There is no such thing as a manual for a high-tech product or service that is written in plain language
Dis_4	When you get technical support from a provider of a high-tech product or service, you sometimes feel as if you are being taken advantage of by someone who knows more than you do
Dis_5*	If you buy a high-tech product or service, you prefer to have the basic model over one with a lot of extra features
Dis_6*	It is embarrassing when you have trouble with a high-tech gadget while people are watching
Dis_7	There should be caution in replacing important people-tasks with technology because new technology can breakdown or get disconnected

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Dis_8*	Many new technologies have health or safety risks that are not discovered until after people have used them
Dis_9*	New technology makes it too easy for governments and companies to spy on people
Dis_10*	Technology always seems to fail at the worst possible time
Insecurity	
Ins_1	You do not consider it safe giving out a credit card number over a computer
Ins_2	You do not consider it safe to do any kind of financial business online
Ins_3	You worry that information you send over the Internet will be seen by other people
Ins_4	You do not feel confident doing business with a place that can only be reached online
Ins_5*	Any business transaction you do electronically should be confirmed later with something in writing
Ins_6*	Whenever something gets automated, you need to check carefully that the machine or computer is not making mistakes
Ins_7	The human touch is very important when doing business with a company
Ins_8*	When you call a business, you prefer to talk to a person rather than a machine
Ins_9*	If you provide information to a machine or over the Internet, you can never be sure it really gets to right place

**item excluded from the analysis with low loading(less than 0.5)*

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School aspiration in the context of academic self-regulation

I. Burešová and H. Klimusová

***Abstract*—**The study's primary focus is to examine possible correlations between students' aspirations in relation to their school results and the level of their academic self-regulation, including its individual components. The importance of the level of school aspirations of every adolescent individual is based upon the fact that the level of aspiration toward certain school performance significantly influences his/her future life and professional path, because it is reflected, to a significant degree, in the self-regulation mechanisms applied in attaining academic goals. The results of this study indicate the importance of observing the level of students' school aspirations and supporting the development of academic self-regulation in early adolescence, because a high level of self-regulation during this developmental stage is an important predictor of later success in school and work, in social relationships, and life in general (see bellow). The results of the presented study, using a sample of 336 adolescents, yielded a number of interesting interconnections, which should be reflected in the way students are prepared in school and at home during the adolescent developmental stage, particularly taking into consideration the identified gender differences.

***Keywords*—** academic aspirations, academic self-regulation, adolescence, gender

I. Introduction

EDUCATIONAL aspirations of students are understood to be a significant aspect of the educational process. According to views of professionals [1, 2], the establishment of educational aspirations during adolescence is influenced not only by the specific educational system and socio-economic status of the parents but also by a number of important socio-psychological factors (such as students' mental and cognitive abilities, motivation and self-regulation levels, etc.) and influences (e.g., quality of relationships with parents, teachers, classroom and school atmosphere, etc.).

The significance of the level of school aspirations of each adolescent individual is based on the fact that aspirations toward a certain school performance mediates and influences future life and professional path [3]. In general terms, aspiration is part of the theoretical framework of motivation, which is a very important factor in the process of education and learning, because it is reflected in the students' learning success and is an inseparable integrated part of their motivation to study in general. The motivation to study comprises a broad framework of individual internal needs and external motives, which affect the development of the adolescent's personality and form his/her character and attitudes throughout the entire life. During adolescence, the majority of these influences undergo relatively great changes. During school years, in addition to parents, teachers, class peers, school atmosphere, and last but not least, the entire educational system become an important external stimuli, which affects the establishment of motivation and thereby the aspirations of an individual. Considering our primary research study goal, we are purposely leaving out factors, which do play an important role in students' academic aspirations, such as, the family's socio-economic and class status, and focusing on studying possible relationships between the level of the above-mentioned educational aspiration of students and the level of their self-regulation with respect to academic goals.

Self-regulation is a multidimensional construct, which encompasses the ability to behave according to social norms and appropriately regulate one's behavior to attain a set goal, and which is established in the course of the cognitive development and socialization of an individual. It is usually divided into intentional self-regulation, characteristic of goal-oriented behavior and developing throughout life, and organismic self-regulation, which comprises all physiological structures and functions of the organism, functions on a biological basis and is innate [4, 5]. The main theoretical base of this study is the SOC self-regulation model (Selection, Optimization and Compensation) created by Baltes et al. [6], describing intentional self-regulation. The model posits three fundamental self-regulation mechanisms used by an individual to dynamically regulate his/her behavior throughout the entire life. In this model, Selection is the first step in the self-regulation process, at which point the individual sets his/her goal. Optimization, then, is a process during which, by means of gaining new knowledge and capabilities, the individual enriches his/her resources. Subsequently, Compensation allows for attaining the goal through alternative means or changing it entirely. In the period of adolescence, an individual gradually learns the necessary mechanisms in order to utilize intentional self-regulation, in terms of behavior regulation and attaining long-term goals, which are reflected in the level of academic aspiration as well – and this relationship is precisely the subject of the current study.

II. Method

For the purpose of the presented study we used the quantitative research design implemented by a single

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questionnaire inquiry using a combination of questionnaire methods. The study has a partially explorative character because some of the facts studied have so far not been verified in research.

A. Research Aim

The aim of the study was to map possible relationships between students' aspiration level and attained school results, along with the level of their academic self-regulation mechanisms. Another partial aim was to map possible gender differences involved in these relationships.

B. Measures

The presented study uses a combination of the following questionnaire methods:

Questionnaire constructed by our research team - this questionnaire collects demographic data about the participants, their parents, and select facts relevant to the research aim, such as family relationships/background, school aspiration and school success, and others. Participants answered open-ended, multiple-choice or Likert scale type questions.

SOC Questionnaire – Academic domain (Geldhof, Little, Hawley, 2012) – this is an adapted version of Baltes' SOC questionnaire (1997), created by the authors to measure SOC in adolescents. It consists of 28 items, which are unequally distributed into 4 subscales (Initial Selection, Optimization, Compensation and Loss-Based Selection). In order to take into account the specifics of the adolescence developmental stage, the authors changed the qualitative meaning of the subscale Loss-Based Selection – in this age group, the loss-based mechanism is considered to be lack of school success. In our sample, the questionnaire's individual scales and the total score were internally consistent (Cronbach's alpha 0.702-0.876), except for the Initial Selection scale, which, however, consists of only 5 items (Cronbach's alpha 0.546).

C. Procedure

Research data collection took place in the form of single questionnaire inquiry administered at random primary schools in the Czech Republic. A trained professional administered the battery of tests with identical instructions. The participants' anonymity and the ethical approach of the research were maintained. After processing all the data, all the participating schools were presented with the final report of the results.

D. Sample

The research sample comprised 6-9th grade students (aged 13-15 yrs., m=14.0, sd=0.68) from common primary schools. A total number of 336 participants, 186 (55%) girls, took part in this study.

E. Data analysis

We used the t-test for independent samples, and the Mann-Whitney nonparametric test for gender differences in students' and parents' aspiration levels. The relationships between the self-regulation questionnaire scales and other variables were verified using nonparametric Kendall's Tau coefficients (considering the significantly slanted differentiation of variables measuring school results and school aspirations). One-way ANOVA was utilized to compare groups of students divided according to the aspiration and school results discrepancy in academic self-regulation scales.

III. Results

For clarification purposes, the following is a summary of the key results.

A. Students' aspiration level in relation to attained school results

The students' aspirations were evaluated on a 4-point scale (1=not at all true; 4=totally true). Table I summarizes descriptive statistics for the entire sample and for girls and boys separately. It is apparent that the aspiration level in adolescents is relatively high, and that is true for boys and girls (gender differences were not statistically significant).

Table I. Descriptive statistics for students' aspiration scale

I care a lot about having good grades	Total	Boys	Girls
Mean	3.28	3.24	3.31
SD	.68	.67	.69
Median	3.00	3.00	3.00

The correlations between students' aspiration and their school results were found to be rather weak. Kendall's Tau for the total sample was -0.275 ($p<0.01$). The direction of the relationship was as expected, that is, the higher the aspiration the better the school results (the coefficient's negative value is due to the Czech grading system, which is 1-5, where 1 is the best grade). The relationship was similar for the subgroup of boys (-0.286) and girls (-0.262). The correlations between students' aspiration and their school results were similar, even concerning the results in key subjects of Czech language and math, with the exception of the correlation between aspiration and math results in girls, where Kendall's coefficient was significantly lower than in the correlation between aspiration and overall school results (-0.159; $p<0.05$).

B. Level of academic self-regulation (score comparison in the SOC-A scales)

Table II shows descriptive statistics and t-test results for the comparison of the scores for girls and boys in the SOC-A scales. It is apparent that in the overall score, as well as in the individual scales (except for Loss-Based Selection), girls reach a slightly higher level of academic self-regulation.

Table II. Gender differences in the SOC-A scales

scale	*sample*	*mean*	*sd*	t_{334}	*p*
Selection	male	20,4	5,2	-2,46	≤ 0,05
	female	21,7	4,4		
	all	21,2	4,8		
Optimization	male	47,0	9,3	-2,07	≤ 0,05
	female	49,1	8,0		
	all	48,2	8,7		
Compensation	male	37,8	8,3	-2,77	≤ 0,01
	female	40,2	7,4		

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	all	39,1	7,9		
Loss-Based Selection	male	21,5	5,4	-0,18	ns*
	female	21,6	5,3		
	all	21,6	5,4		
SOC_A total	male	126,9	21,9	-2,31	≤ 0,05
	female	132,3	19,0		
	all	130,0	20,4		

* *ns = non-significant difference*

C. Correlations between attained school results and academic self-regulation level

We found evidence of correlations, albeit relatively slight, between academic elf-regulation levels and attained school results (see Table III with Kendall's Tau coefficients). The strongest correlations were found between school results and the Optimization and Selection scales.

Table III. Correlations between academic self-regulation scales and school results

scale	*overall school results*	*results in Czech language*	*results in mathematics*
Selection	-0,190**	-0,134**	-0,138**
Optimization	-0,200**	-0,139**	-0,179**
Compensation	-0,057	-0,107*	-0,080
Loss-Based Selection	0,096*	0,075	0,067
SOC_A total	-0,130**	-0,107*	-0,127**

*p≤ 0,05; **p ≤ 0,01

D. Correlations of the discrepancy between students' aspiration and attained school results with academic self-regulation level

We created a new variable, which reflects the difference between standardized level of student's aspiration and a standardized scale of attained school results. This variable allowed us to divide our sample into 3 groups: 1) students with aspiration lower than the attained results (n=84); 2) students with aspiration level corresponding to their school results (n=203); 3) students with aspiration level higher than their results (n=49). These three groups were then compared in their academic self-regulation level. Table IV shows the results. All tested differences were statistically significant. Averaging the groups, it is clear that, above all, the group of students with aspiration lower than results attained manifests a lower level of academic self-regulation than the other two groups in all scales as well as the overall score.

Table IV. Comparison of academic self-regulation level with respect to the discrepancy between aspiration and school results

scale	*group*	*mean*	*sd*	*F*
Selection	1) aspiration < results	20,0	5,6	3,87*
	2) aspiration = results	21,5	4,6	
	3) aspiration > results	22,0	3,8	
Optimization	1) aspiration < results	45,1	9,0	7,23**
	2) aspiration = results	49,0	8,5	
	3) aspiration> results	50,0	7,5	
Compensation	1) aspiration < results	37,1	8,5	3,95*
	2) aspiration = results	39,6	7,5	
	3) aspiration> results	40,6	7,8	
Loss-Based Selection	1) aspiration< results	20,2	5,9	5,18**
	2) aspiration = results	21,8	4,9	
	3) aspiration> results	23,3	5,7	
SOC_A total	1) aspiration < results	122,4	22,1	8,73***
	2) aspiration = results	131,7	19,2	
	3) aspiration > results	136,5	19,0	

*p≤ 0,05; **p ≤ 0,01; ***p ≤ 0,001

IV. LIMITATIONS

Limits of the study flow from the research design itself, carried out by means of self-reporting questionnaire method, and from the selection of the research sample, in which we were not able to guarantee representativeness. Moreover, it is also possible that superintendents of schools, which have generally reached good results, were mostly the ones to agree to participate in the study.

V. DISCUSSION

The above-mentioned results have allowed for a number of interesting conclusions, which can be very well utilized in everyday pedagogical practice. The aspiration level in the given research sample of adolescents was relatively high, both in girls as well as boys, which is in agreement with the results of research studies conducted with comparable samples [1]. At the same time, our results confirmed the research assumption concerning the mutual relationship between students' aspiration level with respect to school results and their actual attained school results. The higher the aspirations stated by the students the better the school results they attained. This conclusion unequivocally indicates that it is necessary, during this sensitive developmental stage, to target the determination of the educational goals of the students, and using suitable pedagogical means, to continuously support and develop their

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need for performance, represented by their aspiration for high quality school results.

In this context, the statistically evident, albeit relatively slight, correlations found between academic self-regulation level and attained school results can be considered significant. The strongest relationships were found between school results and the Optimization and Selection scales. Since, in an academic environment, Selection (S) encompasses the selection of a study goal and Optimization (O) represents behavior enabling the attainment of this goal, we can assume, based on the given results, that students' self-regulation mechanisms in this developmental stage are not yet satisfactorily developed (compare [5]). We did not find a positive effect of the use of the Compensation (C) mechanism, employed when it is not possible to attain the set study goal, representing an individuals' efforts to attain this goal in a different way (ask for help from, for example, the parents). Neither did we find a positive effect of a new goal selection based on the unsuccessful attainment of the original goal (LBS), which usually represents a selection of a substitute goal. Therefore, in the educational process, we should pay special attention to the development of the latter two self-regulation mechanisms. The importance of the level of self-regulation in adolescence for adequate school performance is evidenced by the correlation found between the students' aspiration level, with respect to their school results, and the level of their self-regulation. We found that in all scales and in the overall score, the group of students with aspiration level lower than their attained school results manifested a lower level of academic self-regulation than the two other groups (see Table 4). Therefore, it is evidently necessary to support the successful development of the last two self-regulation mechanisms in the teaching as well as home work process, since their flexible utilization is closely connected to successful coping with the demands of education as well as life itself [7].

VI. Conclusion

The findings of the present study, which was a part of a large-scale research project, contribute to a better understanding of the relationships between academic aspirations of adolescents and their school achievement, parents' aspirations, and perceived parenting styles. A supplementary objective was an exploration of potential gender differences in the scope and size of these relationships. The results highlighted the role of the father in children's education, especially in boys. The findings are applicable especially in the context of continuous academic preparation in home environment and can be used to help promote the development of appropriate aspirations in teenagers in the domain of school achievement.

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Reading interests of Demonstration School of Suan Sunandha Rajabhat University students

Ratanavadee Takerngsukvatana

***Abstract*—**The purpose of this research was to study the reading behavior and problems in reading of the students at Demonstration School of Suan Sunandha Rajabhat University. A stratified random of 103 samples was collected. A questionnaire was developed to collect data and to obtain students' opinions their reading behavior. The findings revealed that the majority of respondents read mainly for entertainment purpose. They preferred to read comic. The majority of respondents read the average of 3-4 books a week. The best time to read was leisure time. The average reading time was about 30 minutes to 1 hour. The places to read were home and library. Buying the books by themselves and borrow from the library were two main sources of books. As for problems in reading, it was found that most respondents lacked interests in reading; as for this research results, the school should have a plan for developing the curriculum to suit with reading behavior of the students by holding an activity promoting reading to be varied in order to urge the interests in reading and instill reading habits for students.

***Keywords*—**reading, reading behavior, reading interest, reading problems

I. Introduction

READING is an important basic of learning and an important tools in seeking knowledge, which leads to the development of intellect, knowledge and behavior as well as helping in lifetime learning [1]. Reading is also a basic language skill using as a tool in education as most philosophers and famous people are readers by seeking knowledge from reading. As it is seemed, the advancement of several field in science, social study and education are from learning by reading.

Every countries determines reading as a foundation of every level of education which has to be developed to allow learners to possess ability; as for Thailand in the present time, it is found that books are the media that gain lower popularity as the no reading of books are from preferring to listening to radio and watching television. The government has realized the importance of reading; therefore, the 2nd April in every year has been specified as the reading day and determined B.E.2552-2561 to be a decade of reading by determining strategy for promoting reading as follows: 1. increasing reading capacity 2. building reading habits 3. creating atmosphere, environment to support reading for Thai person of every group [2]. In addition, the National Education Act, B.E. 2542 was stipulated to have learning procedure arrangement for learners by allowing educational institute to hold activities promoting reading to make learners learn from real experience, practice, be able to think, have reading habits and create a yearning for knowledge continuously [3].

Moreover, the Office of Basic Education Commission as the unit responsible in arranging basic education has determined targets in education that other than textbooks, students have to read overtime books as follows: primary education year 1-4, at least 5 books, year 5-6, at least 10 books; secondary education year 1-3, at least 15 books and year 4-6 at least 20 books to urge students to be more interested in reading books.

That is to say, reading is an important tool for learning and significant foundation of education because it make students, undergraduate students to learn several things more rapidly and widely. As the learning of subjects either in classrooms or outside of classrooms, they use reading as the tool in learning; 80%-90% of activities of institute has to depend on reading. Learners have to possess reading ability in order to participate in learning and teaching activities very well. Reading make learners to gain wider thought [4].

From the history and background of such problems, namely policies of the country and the National Education Act, B.E. 2542 emphasizing on reading promotion in learning procedure, including, the targets of Bangkok Metropolitan Administration are to increase reading habits of Thai people from former average: only 5 books per year to be 10-20 books per year and the determination of targets in reading in overtime of the Office of Basic Education Commission with Demonstration School of Suansunandha Rajabhat University attached to the Ministry of Education arranging the curriculum of upper secondary education, year 4-6 by opening 3 lesson plans, such as lesson plans of science, math and language.. At the present time, there are 150 upper secondary (year 4-6) students which are juvenile aged 16-18 years. From the survey of reading of this juvenile group, it is found that most of them do not read books and journals so much [5]. As for this results, the researcher is interested to study reading habits of the students of Demonstration School of Suan Sunandha Rajabhat University in order to respond to the policies of the country and to be a beneficial research database to institutes in order to develop the curriculum to suit with reading habits of secondary

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education students as well as to be the guidelines for library to arrange activities for reading promotion efficient for students.

II. Research Methodology

This was a quantitative research that was aimed to survey students' reading behavior. There were five steps of this research. The first step was to study the document and other studies related to reading behavior in order to find the guideline of developing questionnaire of quantitative method. The second step was to define population and sample. The population included 150 secondary education students who registered for the first semester of 2013. A Krejcie & Morgan sampling technique was performed to get a sample group that included 103 students. They were collected at 3 classes, namely secondary education year 4, total 25 persons; year 5, total 46 persons and year 6, total 32 persons. The third step was the development of tool. The tool for this survey was the questionnaire which had three major parts. The first part was designed to ask about the demographics. The second part was designed to obtain the information about reading behavior of students. The third part was about problem in reading. Likert five-scale was designed to measure their problem in reading. The fourth part of the questionnaire was about comments and suggestion that allow students to make. The fourth step was data collection. A stratified random sampling technique was performed to obtain 103 respondents. Finally, the fifth step was data analysis. This step was performed by using SPSS. Descriptive statistics utilized in this research including percentage, mean, and standard deviation.

III. Result of the Study

The findings of this research revealed that the main objective of reading was for entertainment purpose. Comic is the first choice that students preferred to read. The average reading was about 3-4 books per week. The best time to read was when they have free time. Home was the place that students spend time reading the most. The average reading time was about 30 minutes to 1 hour. Finally, the source of books came from buying their own books. As for problems in reading, it is found that most students lack of interests in reading as the details in the following tables and figures.

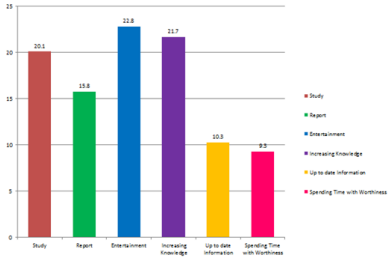

Fig.1 The result of the purposes for reading

TABLE I
THE PURPOSE FOR READING

Purposes for Reading (more than 1 answer)	N	Percentage
Study	37	20.1
Report	29	15.8
Entertainment	42	22.8
Increasing Knowledge	40	21.7
Up to date Information	19	10.3
Spending Time with Worthiness	17	9.3
Total	**184**	**100**

From Table I, The highest objective of reading was entertainment purpose (22.8 %) and spending time with worthiness was lowest objective. (9.3%)

TABLE II
TYPE OF PRINTING MATERIAL OF READING

Types of Publication (more than 1 answer)	N	Percentage
Comics	76	38.4
Novels	25	12.6
Magazines	14	7.1
Newspapers	7	3.5
Textbooks	43	21.7
Short Story	21	10.6
Article	12	6.1
Total	**198**	**100**

From Table II, Comic was the highest printing material that students read (38.4 %) and newspaper was lowest to read (3.5 %)

TABLE III
NUMBER OF BOOK READING

Number of Book	N	Percentage
1-2 Books/Week	34	33.0
3-4 Books/Week	35	34.0
5-6 Books/Week	19	18.4
More than 7 books	15	14.6
Total	**103**	**100**

From Table III, The highest number of book reading was 3-4 books per week (34.0 %) and more than 7 books was lowest. (14.6 %)

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TABLE IV
READING PERIOD

Reading Period	N	Percentage
Before Class	17	16.5
After Class	12	11.6
Leisure Time	52	50.5
Afternoon	11	10.7
Before Bed	11	10.7
Total	103	100

From Table IV, The highest reading period was leisure time (50.5 %) and in the afternoon and before bed were lowest time (10.7 %)

TABLE V
PLACE FOR READING

Place for Reading (more than 1 answer)	N	Percentage
Home	93	63.3
Library	32	21.8
Bookstore	22	14.9
Total	147	100

From Table V, Home was the highest place to read (63.3%) and bookstore was the lowest place to read (14.9%)

TABLE VI
DURATION IN READING

Duration in Reading	N	Percentage
Less than 30 Minutes	34	33.0
30 Minutes – 1 Hour	37	35.9
2-3 Hours	29	28.2
More than 3 Hours	3	2.9
Total	103	100

From Table VI, The highest duration in reading was 30 minutes -1 hour (35.9 %) and more than 3 hours was lowest (2.9 %)

TABLE VII
SOURCE OF BOOKS

Source of Books	N	Percentage
Buy for Self-reading	58	56.3
Borrow from Library	16	15.5
Borrow from Friends	14	13.6
Borrow from Book-lending Store	15	14.6
Total	103	100

From Table VII, The highest source of books was buy for self- reading (56.3 %) and the lowest was borrow from friends (13.6 %)

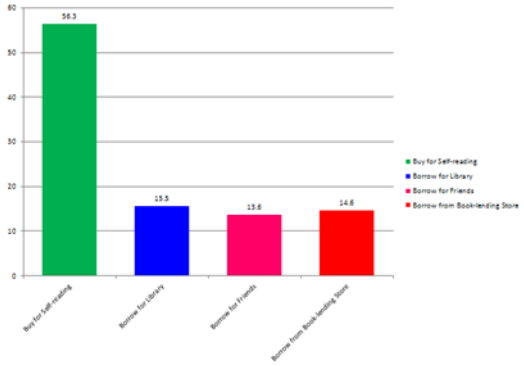

Fig.2 The result of source of books

TABLE VIII
PROBLEM OF READING

Type of Problem	$\overline{X}$	S.D.	Evaluation
Physical Impairment	2.50	1.145	Moderate
Lacking Concentration in Reading	3.16	1.007	Moderate
Lacking Reading Skill	3.05	0.856	Moderate
Lacking Interests in Reading	3.65	1.258	High
Book Format	2.41	1.080	Low
Environment	2.99	1.411	Moderate
Books being Expensive	3.42	1.432	Moderate
Lacking in Language Knowledge	2.73	1.012	Moderate

From Table VIII, it is found that the problems in reading of secondary education students of Demonstration School of Suan sunandha Rajabhat University, dividing according to the problems in reading are in moderate level; when considering each aspect, it is found that most students are lacking interests in reading ($\overline{X}$ = 3.65), secondarily, books being expensive ($\overline{X}$ = 3.42) and the least problem is the book format ($\overline{X}$ = 2.41)

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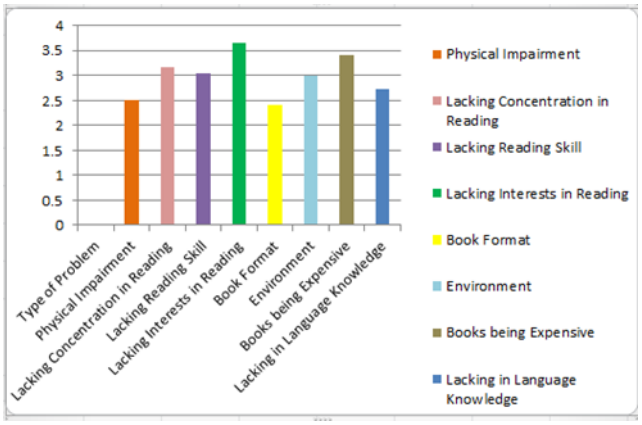

Fig. 3 The result of the problem of reading of student of Demonstration School of Suan Sunandha Rajabhat University

IV. Discussion

From this research, it is found that students of Demonstration School of Suan Sunandha Rajabhat University in overview have reading behavior in moderate level; it is interested that most secondary education students read for entertainment and a favorite publication is comic being in conformity with the survey results of National Statistical Office [6] in the survey of reading of juvenile, which has been found that juvenile group preferred to read comic. Most sources of read publication are from buying by themselves from bookstore, being in conformity with Sunandha Un-wiset [6] who studied overtime reading behavior of undergraduate students of Chandrakasem Rajabhat University and the research of Supaporn Saengthong [7] who found that the sources of read publication are from bookstore. As for the duration for reading, 30-60 minutes are the time spending in reading being in conformity with the research of Supaporn Saengthong [7] which has been found that most Thai people spend 30 - 60 minutes in reading but not in conformity with the survey results of National Statistical Office in the survey of reading of juvenile, which has been found that juvenile group spends time in reading for 39-43 minutes.

V. Conclusion

From the findings of this study, it can be concluded that the students of Demonstration School of Suansunandha Rajabhat University emphasize on and are interested in reading entertainment books than textbooks. As the reading behavior of Thai people is an unpopular activity because of many reasons, namely lacking of good books and books in conformity with the interests of readers, no good sources of books as well as lacking of motivation in reading and encouraging of the importance in reading making few reading as electronic media such as television, radio and internet appealing more than reading; therefore, both public and private sector should provide support to allow production of good and quality books to be in conformity with readers and to allow development of good quality of library to be easily accessible, convenient in several forms, namely library in community and library in institute and etc.

VI. Future Work

Nowadays there are many ways that attract students to spend their time such as internet, games, facebook and so forth. Therefore, it is not easy to persuade students to read more. There are three recommendations from this study. First, there should be more campaign to promote reading in the campus regularly. Second, there should be different kind of campaign to make students aware of the benefits of reading good books. Third, there should be an adjustment of curriculum with the reading behavior of students.

Acknowledgment

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Psychometric assessment on Adversity Quotient instrument (IKBAR) among polytechnic students using Rasch model

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***Abstract*—**The lack of psychometric testing empirical evidences among the Adversity Quotient (AQ) instrument became a major problem in the aspect of its application. AQ measurement instrument in the context of polytechnic students or IKBAR whom were tested using the Rasch model is believed to be able in increasing their validity and reliability of the items. The objective of this paper is to identify the potential items developed in measuring polytechnic students'AQ. Rasch model was used to study three main assumptions such as item fit, unidimensionality, and local independence. The results showed that the IKBAR items have met with all the main assumptions of Rasch model in measuring the AQ of polytechnic students in Malaysia.

***Keywords*—**Adversity quotient, IKBAR, Rasch model, instrument development.

I. Introduction

ONE of the 18 Critical Agenda Projects (CAP) in the National Higher Education Strategic Plan (2011-2015) is the Polytechnic Transformation [1]. This transformation aims to improve the highly skilled workforce from 23 to 37% by year 2015 [2]. This shift is in line with the current educational situation that is increasingly more challenging. It requires manpower to be more resilient and in competitive spirit [3]. Since more than 25 years ago, National Education Philosophy is seen only as emphasizing the dominant intelligence such as IQ, EQ, and SQ alone. Now, it is time for Malaysia to explore the potential intelligence in producing a student whom are able to handle challenges and that is the Adversity Quotient (AQ). AQ was introduced by Paul G. Stoltz in 1997 with four constructs, namely Control, Ownership, Reach, and Endurance [4]. The idea of AQ was generated when questions arise about how different individuals with the same IQ have responded in different ways to the challenges faced. As each individual has different AQ, the development of AQ instrument will help identify students whom are not able to meet the challenges so that they can be given guidance. The main question that arises is on the inconsistencies of AQ items in different contexts. Measurement instrument from the west and several of countries is not suitable for use in Malaysia. In fact, the challenges faced by each individual from various countries, institutions, and levels of schooling are not the same. Therefore, a total of 220 items are developed from the combined results of 55 challenges and AQ conceptualization which left the remaining 112 items after going through the first pilot test. This study will focus on the actual research or verification phase to identify the final items that best meet the needs of Rasch model. The literature shows many previous researchers questioning the psychometric issues due to the use of original instruments, new instruments, and adaptation of instruments in their studies [5]–[7]. Thus, the research gap can be addressed through psychometric feature testing on the development of IKBAR items through solid empirical analysis such as the Rasch model. The Rasch model has certainly gather the attention of many researchers within the country and abroad to validate the item on their instruments development [8]–[11]. This paper focuses on the validity and reliability of measuring IKBAR through three main assumptions of Rasch model, namely item fit, unidimensionality, and local independence. The main idea behind this research is to identify the weak students from the AQ aspect to be guided by counselors and educators in order to achieve excellent academic performance. Sometimes students with high intellectual intelligence, high emotional, and high spiritual do not guarantee their ability to face the challenges in life and the environment at the polytechnics. Thus, the endorsement of item for each AQ construct with Rasch model is believed to be capable of improving the quality measurement of items.

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II. Rasch Model

A model parameter or Rasch model is easier to apply as compared to other models in Item Response Theory (2 parameter logistics, 3 parameter logistics, and 4 parameter logistics) in addition to its WINSTEPS software that is user-friendly [12]. This model only has difficulty parameter. The difficulty parameter is b parameter and has θ value corresponding to the inflection point on the Item Characteristic Curve. b is the location of the inflection point on the θ scale which has a 0.5 probability of correct responses on a scale of abilities. Rasch model sees the response of a

person as a probability to make the right choice. Decision-making process begins with an equal chance (50:50) and their ability will help them get the final result. The individual will decide to accept or reject the item [13]. Rasch Model combines the algorithm that specifies the expected probability of an item as *i* and individual capacity as *n* in the form of mathematical equations. The mathematical formula for the Rasch model is as follows [14]. The mathematical expression for the Rasch model is as per equation (1).

$$P(\theta) = \frac{e^{(B_n - D_i)}}{1 + e^{(B_n - D_i)}} \quad (1)$$

Equation (1) shows the value of *e* is Euler's constant logarithmic numbers of 2.7183, B_n is the students ability to answer IKBAR item, D_i is the difficulty level of IKBAR item, and P *(θ)* is the adversity quotient score. Therefore, the probability of possibility of a success is B_n - D_i.

III. Methodology

The research involved a total of 1,845 students out of a total of 18,828 in five polytechnics according to zone grouping, namely Politeknik Premier Ungku Omar *(PUO)* (West Zone), Politeknik Sultan Abdul Halim Mu'adzam Shah *(POLIMAS)* (North Zone), Politeknik Sultan Haji Ahmad Shah *(POLISAS)* (East Zone), Politeknik Port Dickson *(PPD)* (South Zone), and Politeknik Kuching Sarawak *(PKS)* (Borneo Zone). The sampling techniques used are the clustered multistage stratified proportional sampling. The proportion value is 10% for each strata as proposed [15]. A total of three strata were involved, namely the type of study programme, year of study, and gender. It is important for researchers to estimate the suitability of the TRI model to the data being used [16]. There are a few assumptions that must be met prior to Item Response Theory (IRT) being used. Researchers need to analyze the reliability and consistency of data [17], [18]. The first step is to identify items that do not meet the requirement of Rasch model (item fit) with MNSQ value or Zstd statistics for each item. Analysis should also be carried out to determine whether items are questioning two or more questions at one time (one-dimensional). Next, other analysis can also be carried out. In the context of this study, the three main assumptions described are item fit, unidimensionality, and local independence.

IV. Finding and Discussion

A. Return Rate

The return rate was around 97.52% and above the proposed determined rate of 75% [19]. A total of 1,845 instruments were successfully collected and filled up entirely by students out of 1,892 instruments that were distributed.

B. Item Fit

The first assumption of Rasch model, which is item fit, will be using the Infit – Outfit Mean Square Analysis (MNSQ) and Outfit Z standard (Zstd) that are capable of detecting whether the research data will show discrepancies with the Rasch model [16]. Fit statistics will help instrument developers to decide the suitability of an item [20]. The findings demonstrate the MNSQ value having recorded from 0.83 logits to 1.28 logits for all 220 items. This MNSQ value fulfills the quality measurement by taking the setting range of item fit in the range of 0.77 logits to 1.30 logits [21]. Zstd also shows the importance of data. It is a statistical fit of infit mean squared *t* standardized that estimates the theoretical mean and variance distribution. Zstd value of between - 2.0 to +2.0 are acceptable values [14]. Nonetheless, if MNSQ is received, the Zstd may be neglected [22]. Table 1 shows several examples of IKBAR item measurement value according to AQ construct. The item polarity value which is early detection to construct validity is also found to be ranging from 0.33 logits to 0.51 logits. The polarity indicates values positive value and exceeding 0.3 [14], [22], [23]. These values also fulfill the bi-serial point ranging value from 0.30 logits to 0.60 logits for a good test and prove that all items work towards a single sub construct measurement [14]. In addition, the Standard Error (SE) is found to be in the range of 0.04 to 0.05 for all 66 items. The SE value is important in demonstrating the accuracy in calculation [24]. This is because most statistical textbooks elaborate on statistical standard error of the mean and not on the standard error of measurement [22]. This range of error is below 0.25 is deemed as excellent [21].

C. Unidimensionality

The second assumption is that of unidimensionality, which means items moving towards measuring only a single construct. This unidimensionality assumption can be met with Rasch Principal Components Analysis (PCA). If this assumption is met, then the Item Response Theory can be used to test the psychometric properties of an instrument. There are four aspects studied on unidimensionality and those are the variance explanation of a residual PCA by contrast, the level of interference on items being measured or unexplained variants in a contrast, the compliance rate for the minimum ratio of 3.1 between the variance measurement, and the fourth is the Eigen value. PCA findings showed that gross variance as explained by measurement is 21.3% and is found to be very close to the expected model of about 21.5%. This value meets the instrument requirements by at least 20%, which has been achieved in consideration of Rasch most minimal requirements [25]. The second aspect is the level of interference on items being measured or unexplained variants in a contrast. The research has set the level of interference to the value of 3 to 5% and is deemed to be very good [21]. The level of interference on items being measured or an unexplained variant in a contrast recorded a 3.2% and is categorized as very good within the range of 3 to 5% [21]. Values less than 10% is evidence to the compliance on unidimensionality [26], [27]. The third aspect is the ratio of variance explained by measurement (21.3%) with the variance of the first principal component (4.1%) is 5.19:1 and exceeds the minimum ratio of 3:1 [28]. The fourth aspect is the Eigen values, set at less than 3 to show that the second dimension does not exist clearly [29]. The eigenvalue of 2.7 proved that the second dimension does not exist clearly in IKBAR.

Table 1. Examples of IKBAR Item Measurement According to AQ Construct

Entry number	Total Score	Count	Measure	Model S.E	Infit		Outfit		Point Measure		Exact	Match	Items
					MNSQ	Zstd	MNSQ	Zstd	Corr.	Exp	OBS%	EXP%	
6	6092	1845	-0.15	0.04	1.03	1.0	1.02	0.4	0.44	0.42	60.8	61.9	Q6-C
11	6039	1845	-0.06	0.04	1.01	0.2	1.05	1.4	0.40	0.42	62.9	61.9	Q11-C
21	6098	1845	-0.16	0.04	0.99	-0.2	0.99	-0.3	0.48	0.42	63.4	61.9	Q21-C
23	6241	1845	-0.41	0.04	0.97	-0.8	0.95	-1.3	0.46	0.41	64.8	62.0	Q23-C
27	5884	1845	0.19	0.04	0.95	-1.4	0.96	-1.1	0.42	0.44	63.2	62.1	Q27-C
29	6041	1845	-0.07	0.04	0.96	-1.1	0.96	-1.2	0.48	0.42	62.9	61.9	Q29-O
31	6116	1845	-0.19	0.04	1.01	0.3	1.06	1.7	0.45	0.42	62.3	61.8	Q31-O
38	5878	1845	0.20	0.04	0.98	-0.6	1.00	0.1	0.40	0.44	65.9	62.1	Q38-O
39	5881	1845	0.19	0.04	0.99	-0.4	0.99	-0.2	0.41	0.44	65.4	62.1	Q39-O
48	6004	1845	0.00	0.04	0.97	-0.8	0.98	-0.5	0.43	0.43	64.7	61.9	Q48-O
61	5997	1845	0.01	0.04	0.97	-0.7	1.03	0.9	0.41	0.43	64.4	62.0	Q61-R
65	5893	1845	0.17	0.04	0.96	-1.0	0.98	-0.5	0.44	0.44	63.7	62.0	Q65-R
77	5821	1845	0.29	0.04	1.01	0.3	1.03	0.8	0.42	0.44	63.1	62.2	Q77-R
79	5941	1845	0.10	0.04	1.01	0.3	1.02	0.5	0.47	0.43	64.9	62.0	Q79-R
83	5837	1845	0.26	0.04	0.99	-0.4	0.98	-0.5	0.47	0.44	63.2	62.2	Q83-R
97	6132	1845	-0.22	0.04	1.07	2.1	1.06	1.8	0.45	0.42	62.4	61.9	Q97-E
100	6303	1845	-0.53	0.04	0.97	-1.0	0.94	-1.9	0.48	0.40	65.7	62.1	Q100-E
104	6150	1845	-0.25	0.04	0.96	-1.2	0.95	-1.4	0.46	0.42	66.6	62.0	Q104-E
108	6110	1845	-0.18	0.04	0.98	-0.5	1.00	-0.1	0.44	0.42	63.0	61.9	Q108-E
111	5829	1845	0.27	0.04	0.94	-1.8	0.93	-1.9	0.47	0.44	64.0	62.2	Q111-E

Table 2. Standardized Residual Variance (in Eigenvalue units)

		Empirical		Modeled
Total raw variance in observations	83.9	100.0%		100.0%
Raw variance explained by measures	17.9	21.3%		21.5%
Raw variance explained by persons	7.3	8.7%		8.8%
Raw variance explained by items	10.5	12.6%		12.7%
Raw unexplained variance (total)	66.0	78.7%	100.0%	78.5%
Unexplained variance in 1st contrast	2.7	3.2%	4.1%	
Unexplained variance in 2nd contrast	2.6	3.2%	4.0%	
Unexplained variance in 3rd contrast	2.3	2.7%	3.5%	
Unexplained variance in 4th contrast	1.9	2.2%	2.9%	
Unexplained variance in 5th contrast	1.7	2.0%	2.6%	

D. Local Independence

The third assumption of the Rasch model is local independence. An item is said to have local independence when there is no correlation between residual items for possible pairing items. Correlation between unequal measure theoretically should be low [30]. This range meets the requirements of local independence, which is correlation values less than 0.30 [31]. The findings in Table 3 show ten items that have the standard correlation of residual values from 0.20 to 0.29. This shows that the response ability of an individual towards any item is not associated with the response of other items in the same construct [8]. There are a few pairing items that need to be refined and the pairs are (Q41 - Q74) and (Q40 - Q72) which are relatively dependent on one another even though from different constructs. However, the low correlation does not give any implication on the item.

Table 3. Standard Correlation of Residual Values

Correlation	Item Number	Constructs	Item Number	Constructs
0.29	Q90	Endurance	Q91	Endurance
0.25	Q41	Ownership	Q74	Reach
0.24	Q15	Control	Q18	Control
0.23	Q40	Ownership	Q72	Reach
0.23	Q34	Ownership	Q35	Ownership
0.22	Q97	Endurance	Q98	Endurance
0.21	Q72	Reach	Q73	Reach
0.21	Q28	Ownership	Q35	Ownership
0.20	Q6	Control	Q8	Control
0.20	Q41	Ownership	Q42	Ownership

E. Item – Person Map

Figure 1 shows the hierarchy of individual ability and item difficulty on a straight line where item Q34 (I am able to explain the reason as to why I am afraid to face the future) and

Q40 (I always try to increase the total hours of study time) are the most difficult item for respondents to agree whereas the easiest item for respondents to agree upon is item Q15 (I am certain there will be job opportunities anywhere). The logits value between +0.67 to -0.90 spread fulfilling the range of +3.00 to -3.00 is deemed good and sufficient (Andrich & Styles, 2004; Hill & Koekemoer, 2013; Linacre, 1994). IKBAR shows that there is no item that is able to test respondents with high AQ. The items developed can only measure the capabilities of students with moderate and weak AQ. The additional items on logits 0.67 until 6.38 can help so that the items can measure students with high AQ (high capability). Based on the Rasch model assumptions, a total of 66 IKBAR items satisfied all the main assumptions such as item fit, unidimensionality and local independence.

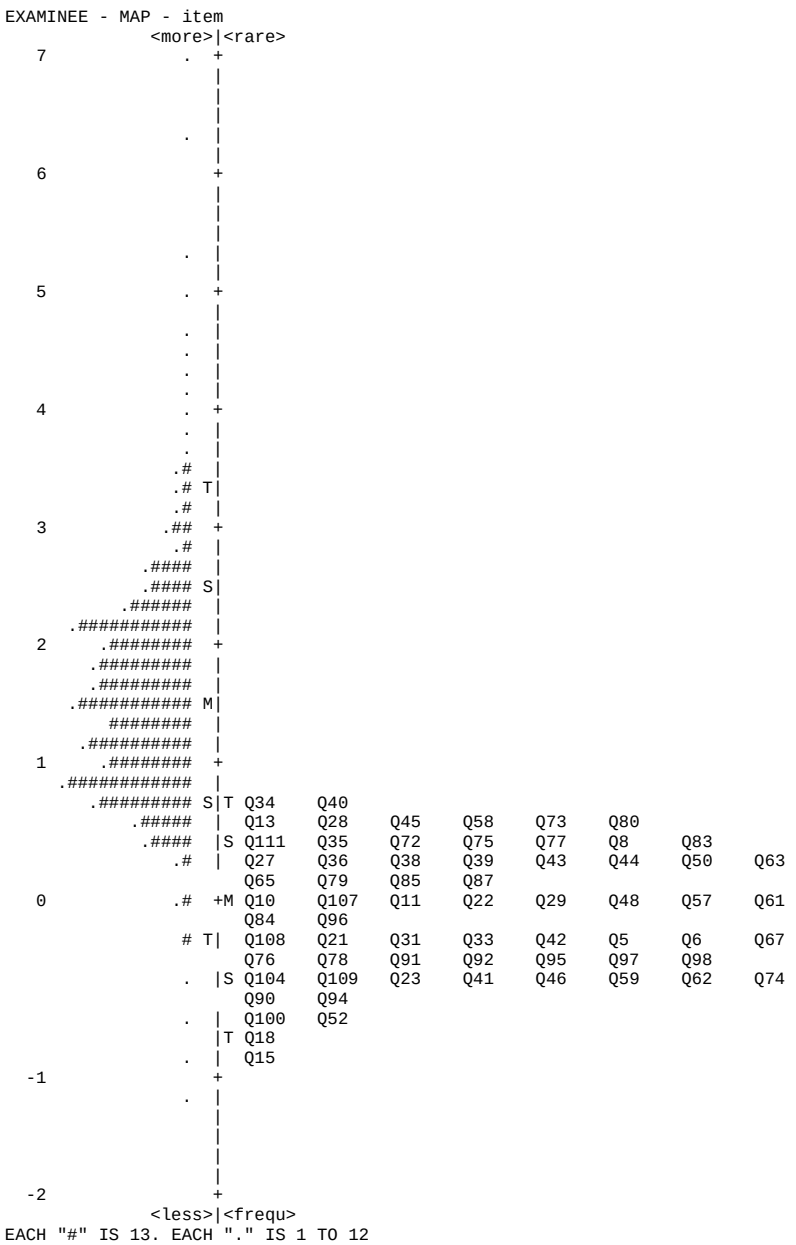

Figure 1. Item – Person Mapping

A total of 112 items were studied in this validation phase with 27 items (Control construct), 29 items (Ownership construct), 28 items (Reach construct), and 28 items (Endurance construct). In total, 46 items were dropped through item fit consideration, item polarity, and Differential Functionality Item across gender. This paper analyses a total of 66 IKBAR items of which are the best and meet the Rasch assumptions.

F. Reliability and Separation Index

Table 4 shows the statistics summary for persons (respondents). The reliability value of an persons is 0.92 and is within the range of values of 0.91 to 0.94, and is categorized as very good. The Cronbach's alpha value of 0.94 is deemed excellent [21]. The individual separation index is recorded at the value of 3.50 and is deemed as good it is over

the value of 2 [35], [36]. Table 5 shows the statistics summary for the items. The findings show that the items reliability which is recorded at 0.98 is deemed to be excellent, being more than 0.94 [21]. The item separation index recorded the value of 7.62 and is deemed good. Item separation index having been more than 3 as well received [36]. Overall, the reliability index value of individuals exceeding 0.8 with the reliability of the item exceeding 0.9 proves that the sample taken is adequate [36]. The reliability value is also found to be better than the recorded original AQ instruments with the value of 0.91 [37]. The study also refers to the quality of measurements stating that the separation index between 3 and 4 as good and more than 5 as excellent [21]. In this study, individual separation index is good and the item separation index as excellent.

Table 4. Statistics summary for individuals (respondents)

	Raw Score	Count	Measure	Model Error	*Infit*		*Outfit*	
					MNSQ	ZSTD	MNSQ	ZSTD
Mean	214.3	66.0	1.56	0.22	1.01	-0.30	1.01	-0.3
Standard Deviation	18.6	0.0	0.88	0.04	0.55	0.55	0.54	3.0
Max	263.0	66.0	6.38	1.01	4.48	4.48	4.46	9.8
Min	132.0	66.0	-1.12	0.16	0.04	0.04	0.04	-9.9
Real RMSE	0.24	Adj. SD	0.85	Separation	3.50	Person Reliability		0.92
Model RMSE	0.24	Adj. SD	0.86	Separation	3.86	Person Reliability		0.94

Person Raw Score-To-Measure Correlation = .97
Cronbach Alpha (KR-20) Person Raw Score Reliability = .94

Table 5. Statistics summary for items

	Raw Score	Count	Measure	Model Error	*Infit*		*Outfit*	
					MNSQ	ZSTD	MNSQ	ZSTD
Mean	5993.8	1845.0	0.00	0.04	1.00	-0.1	1.01	0.2
Standard Deviation	193.6	0.0	0.32	0.00	0.10	2.7	0.10	2.9
Max	6496.0	1845.0	0.67	0.05	1.27	7.1	1.28	7.2
Min	5560.0	1845.0	-0.90	0.04	0.83	-5.0	0.84	-4.9
Real RMSE	0.4	Adj. SD	0.31	Separation	7.62	Person Reliability		0.98
Model RMSE	0.4	Adj. SD	0.31	Separation	7.76	Person Reliability		0.98

UMean = 0.000 UScale = 1.000
Item Raw Score-To-Measure Correlation = -1.000

CONCLUSION

This study showed that the IKBAR items are appropriate in the context of polytechnics and do not contradict with the main assumptions of Rasch model. The improvements proposed for this study is by conducting research through the analysis on Differential Item Functioning in order to examine whether there exist the possibility of biased, unfairness and bias, namely items in favor of only one group of individuals [38]. The psychometric feature testing has proven that the high validity and reliability of IKBAR were capable of achieving the goal in identifying polytechnic students who are weak in their AQ for the purpose of guidance and catalyzing the improvement of academic performance.

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Self-Assessment Methodology in Active Learning Electrical Engineering

Z. Raud and V. Vodovozov

***Abstract*—** Self-assessment methodology is described as the part of active learning process in electrical engineering. The focus is on the disciplines related to electronics and electrical drives. Some principles are postulated that act as a prerequisite of successful self-assessment in evaluation of theoretical knowledge, practical experiences, and computer simulation skills. Analysis of student's participation in self-assessment, lesson attendance, and final grades represents a number of benefits of the proposed approach.

***Keywords*—**Active learning, education, electrical engineering, self-assessment.

I. Introduction

Active learning quickly finds favor in a lot of areas of knowledge transfer. This educational approach first presented in [1] is based on a known precept of didactical theory that learners are most heavily motivated to solve tasks they evidently perceive as a need to understand. Active learning concentrates on the students' wish for learning moving the responsibility of knowledge acquisition on learners. A significant advantage of such a student-centered method focuses on transition from the time-based to achievement-based education. It depictures learning as problem formulation with following searching of appropriate issues and solutions where the students get ownership of their education. Simultaneously, the role of the teachers and academic staff transfers from "oracles" shared knowledge to "facilitators" who guide and support the learners in their own learning.

Active learning expands greatly the educational opportunities for various groups of students, including the strong and the weak ones. Applying this methodology, the learners construct their own knowledge using the new learning skills, exploration experiences, feedback evaluation, and reflection [2]. In the context of active learning, the laboratory practice and computer-oriented exercises become the most important stages of engineering training whereas lecturing goes to the auxiliary side.

This paper focuses on an assessment stage in the scope of active learning. The aim of the assessment is to interpret learners' personal understanding and their possibilities to design individual examples against the existing theoretical and practical tasks. Being a flexible tool to focus attention on important aspects of knowing, the assessment must help to explore what students are actually learning and how they do it. It should demonstrate what learners see as important concepts and how they relate these concepts. The assessment results can have implications for clarifying the learning objectives, refining instructional strategies, identifying appropriate evaluation tools, and understanding how the learning objectives are being realized by students.

The goal of the reported research is to ground the benefits and to discuss the problems of the new self-assessment methodology introduced in six electrical engineering disciplines: AAR3320 – Electronic Engineering, AAV0020 – Power Electronics, AAV0050 – Advanced Course of Power Electronics, AAV0080 – General Course of Electrical Drives, AAV0040 – Advanced Course of Electrical Drives, and AAV0060 – Electrical Drives and Power Electronics.

The paper describes the solutions of following problems in the field of electrical engineering education: benefits of self-assessment, distinction from the traditional learning evaluation, self-assessment of theoretical knowledge, self-assessment of practical skills, and self-assessment in the computer exercises. Finally all the results are compared and discussed.

II. Benefits od Self-Assessment

Traditionally the grading and evaluation schemes are prescribed by the existing educational system. Every curriculum indicates the number of examinations and practical credits the learners need to pass. As a rule, the students are required to take the theory exams that qualify them for the next semester, and to get some credits as prerequisites for further exams. Typical drawbacks and ineffectiveness of such evaluation were cited frequently [3], [4].

In practice, answering the questions posed to students regarding different aspects of their activity is often liable to the subjective and narrow grading. Such traditional "paper and pencil" evaluations are usually criticized as heavily oriented towards the exams, without other forms of assessment [5]. When the sole evaluation purpose is to measure the students' ability to respond the questions asked in the form of examinations and credits, it is difficult to understand whether the students can apply their knowledge and use it in the real engineering activity [6]. In this case, the assessment does not

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represent a part of the learning process, but rather some scheduling events taking place at fixed times during the academic year.

Meanwhile, an assessment is required to give the feedback relatively the students' progress and achievements. It has to promote learning and to affect on what the students learn, how effectively they spend their time and consequently on the outcomes of their learning. Undoubtedly, both the effectiveness of engineering education and the overall study advancements depend strongly on how well the instructors feel the role of evaluation. If assessment is considered as an integral part of education without which learning is impossible, the students will be stimulated in regular assessment to get the required learning outcomes. Such assessment as a tool becomes a prerequisite for the professional development [7].

The complexity in the practical application of the theory represents an important feature of traditional engineering training. Knowledge transfer from the class to real-life situations and applications cannot be spontaneous. As a rule, sequential educational interventions are requested in order to increase the ability for such a transition [8]. Therefore, the evaluation methodology must be reformulated and redefined to stimulate a trainee via assessment thus helping him to receive the actual and useful feedbacks.

Self-assessment discussed in this paper can serve as a powerful tool to overpass the barrier between the practical activity and the theoretical knowledge [9]. In contrast to the traditional grading which target is the only evaluation of the learning process without considering this procedure as a tool of improving learning, an effort has to be made to transfer from assessment of learning towards an assessment for learning [7], [10], [11].

By choosing the formative role of mistakes as the major driver for the student motivation, our goal was to arrange the transition from the "one-shot grading process" to "continuous evaluation". The developed assessment model first published in [12] performs several iterations in the course time span by merging learning and evaluation into the common cycle. Thanks to a quick feedback and learning connection with the student's interest, in this way assessment does not take place at some fixed times during the term but flows along with other lessons. Such an evaluation built into the lectures, labs, and exercises monitors the students' progress uninterruptedly and applies it as a guideline of the learners' achievements. Now it is used as a way of reflection and a feedback for teachers and staff in gauging questionable problems, identifying weak areas, and addressing issues to watch where students are in their learning progress. It is important that the new approach has changed the students' thinking about the assessment as a learning instrument, and not just in passing examinations. It provides integration of teaching and learning with evaluation, which became meaningful, authentic, and engaging. The basic features of this methodology relate to performance of students as the active participants in the assessment of their own work and in the design of own reflective thinking [13].

III. Self-Assessment in Theoretical Background

Following the cycle of lectures, students have to be assessed in their theoretical knowledge level. At the same time, every our learner has an ability to make evaluation using the self-assessment procedure. He/she can enroll or break this process at any time of the course continuation. To support self-assessment, the rules and problems for the final examination are brought to the students' attention in the beginning of the semester.

In AAR3320 – Electronic Engineering, AAV0020 – Power Electronics, and AAV0050 – Advanced Course of Power Electronics, an in-class assessment has been arranged as a regular, mandatory event of every lecture. It has a form of individual quizzes with multiple choices. In AAR3320 and AAV0050 the quizzing forms are shared among the students before the lecture. In AAV0020 the quiz questions appear on the screen during or after the lecture. Missed lecture means the lost of the rating scores therefore the students concern about lecture attendance themselves. The drawbacks of such in-class assessment relate to its time costs for the instructor who must examine and evaluate many quizzes. The benefit represents enough flexible scoring system, which can include negative scores for incorrect answers and non-linear grading of the specific and important questions.

In AAV0080 – General Course of Electrical Drives, AAV0040 – Advanced Course of Electrical Drives, and AAV0060 – Electrical Drives and Power Electronics, the personal quizzes are open in the Internet in the prescribed time slots of the lecture day, usually from midnight to midnight thought the number of attempts is unrestricted. In this way, the students visit the lecture with an intention to find the quiz answers or to correct their information obtained before the lecture. At such an approach, the lecture attendance seems optional.

Our experience argues that sharing the personal quiz sheets among the students before the lecture represents a good practice. In this case, the students endeavor to come beforehand, to discuss and clarify their problems, to find the sources of information, to occupy the best places in the classroom, and to ask the lecturer about their problems.

The use of Web, notebooks, textbooks, etc. is not prohibited during the quizzing. Students usually discuss probable solutions with each other or they listen to the lecturer, make abstracts, interrupt him, and ask qualifying questions during the lecture. To support the students' interest, the solutions of many of the quiz problems are included into the lecture content, evidently or marginally.

Liable quiz answers do not represent the secret. At the end of every lecture, a lecturer reserves a time slot (5 to 10 minutes) for discussion and debates both the students with the instructor and with each other. Here, a lecturer clarifies the quiz problems and makes recommendations. At the same time, multitasking is a good way to prevent from direct answering the quiz questions.

To support learners in their self-assessment performance, an

original learning content management system (LCMS) has been designed [14], which represents a segment of the national learning management system built on the basis of the well-known Moodle toolkit [15]. The main components of the developed LCMS are placed in the repository of Estonian National e-Learning Portal. The system includes the Web-textbooks on Electronics, Power Electronics, and Electrical Drives as well as the hypertext tutorial aids, videos supporting the lecture understanding, weekly updated assessment sheets, the examination problems and their rules, and some other e-documents. As well, the LCMS shares self-evaluation recommendations and the rating tables in which information about student's scores is updated periodically.

All student responses are supported with an instructor's feedback. The most effective teacher-to-student out-of-school collaboration is arranged with the help of social media, primarily via the Facebook pages. Every course is supported with such an open-access page. Discussions through the Facebook are very fruitful thanks to its powerful tools, such as personal profiles, chats, pictures, videos, etc.

If a student's self-assessment rating does not exceed '3', it means that at the end of the term he/she needs to take a traditional exam the grade of which depends on the solution of the proposed examination problems.

During the learning, the students follow online their current rating and watch expected examination grade. This information serves them as an instrument for planning, adjusting, and prediction their learning outcomes.

Self-assessment is not only an important but also a very designing part of the learning process. To support intrigue, a lecture introduces such game excitements as prizes, losses, plus/minus scores, levels, barriers, etc. attractive to a present-day student. A predicted grade and expected exam forecast hold the learner alive during the semester till the session.

IV. Self-Assessment in Laboratory Practice

In most of the traditional laboratories the students execute earlier prepared experiments. Sometimes they are allowed to make small rearrangements, but usually they only assemble the circuits and assign the predefined input parameters before experimentation starting. At such an approach, the learners focus on performing the actual experiments and physical data acquisition without any preparations for the laboratory work. As a rule, the students focus on the manual made as a cookbook. They learn from such a tutorial aid how to use the equipment in accordance with basic theory principles, perform measurements, fill in the tables, and draw the diagrams for the equipment provided. This methodology does not consider students individual knowledge or learning styles. Instead, each trainee has to solve the same problem and answer the same questions.

Our goal in the labs organization is to approach practice to the theory as close as possible, to effectively employ novel online tools and devices, to face real-world situations, to interact with peers in circumstances that require problem solving skills developed through close collaboration, which is characterized by initiative, creativity, etc. This also emphasizes the benefits of experimentation within other learning activities, in part, because these activities permit students to interact in a new fashion.

Following this goal, our main method to increase student's activity in experimentation and to suppress cheating consists in application of multi-variant multi-choice individual directions and questions and in increasing the number of open problems where students can accomplish their own tasks. Since the tasks and questions as well as the choices within the questions are shuffled randomly, the number of variants is actually equal to the number of students.

At the same time, in all the practical tasks the participants are supported with full access to the course materials that could be printed out prior to the experimentation. Additionally, they can apply any stimulus materials (animations, simulations, and virtual experiments in the form of Java applets or Flash objects) to generate responses or analyze data.

The process of students' competence evaluation is generally done at every stage of the laboratory session, including pre-work and post-work talks, successful completion of the experiment, and report submission. All these performances and the laboratory report are checked and, once the students complete the laboratory module both his particular weighting scores and the final grade are prepared and displayed. After the report is presented, the following review options help the learner to understand the question solution and to further improve his skills: whether his result is correct, what is the right answer, and what is the teacher's feedback? The standard Moodle report engine includes a suitable style for the result displaying. Currently the grade sheet is published where all the laboratory users and instructors can easily keep the information for future reference.

Additional benefit is obtained from the self-assessment procedure based on automatically scoring answers on the questions regarding the practical lab preparation. As well, each laboratory work involves both the compulsory and the optional items. Solution of only major problems is mandatory whereas the other ones are optional. Participants will obtain additional scores if the team implements the optional points.

To understand how students perceive the work, we improved the conclusion section of personal lab reports. Here, the reporters are asked about ease of access laboratory modules and their ability to help in concept clarifying. We ask the student's recommendations regarding stimulation their interest in experimentation and work organization as well as about mistakes in the circuits, manuals, methodology, etc. Every fruitful advice is graded with additional score and serves for the future work enhancement. It enables evaluating instructional materials and methods and thus helps in improving teaching effectiveness.

One useful feature of an automatic scoring is the deadline and cut-off time scheduling. It is prohibited to start the next

lab without reporting the previous work, to begin work in the case of coming late, as well as to get optional points after deadlines. Also, nothing can be improved in the report after the cut-off date and/or grading. This helps to discipline the learners and increase the responsibility for every step and action.

In this way, the proposed e-assessment system of the laboratory practice opens the possibility to evaluate not just students' declarative, but also their procedural knowledge (i.e., explaining and applying the skills, answering "why and how" questions, etc) needed for interacting with equipment and colleagues in a variety of paths. This focus on the skill priority is tailored to students' engaging in development such individual and collaborative aspects like discipline, interdisciplinary context, pragmatic outcomes, and professional preferences for getting the most out of their learning.

V. Self-Assessment in Computer Simulation

Objectives of exercises in computer simulation are to prepare experts in the schemas and to develop the trainee's experiences with major types of electrical devices. The students learn how to identify the circuit functions and determine how they perform. To this aim, they study the signal input stimuli, collect the output data, and compare them with the expected responses defined in the textbooks and manuals. Beside the system design, learners are responsible for appreciation of the diagnosis strategy, which requires them to analyse the circuits and their functional specifications. Students should determine what faults and malfunctions they detect and which tests and inputs the fault propagates at.

Below, a collection of principles is postulated which acts as the prerequisite of successful assessment of computer-aided exercises.

First, multitasking and personalization are the compulsory conditions for the students' evaluation. Every student should constantly feel his own liability for the learning result.

Second, there is no way to prepare an engineer without calculation tasks. We try to apply in practice every formula given during the lecture in one way or another. Very short verbal calculations, approximate measurements, and preliminary estimations are the important parts of engineering practice.

Third, the student's ability to ask questions also demonstrates his knowledge level. Specially, it concerns the classroom lessons that should reserve enough time to answer the student's requests.

Fourth, as repetition is an important part of knowledge appreciation, a part of exercise problems comes from the previous lessons. Also, additional questions in examination cards include the computer tasks.

Assessment during exercises invokes to evaluate:

- understanding of the learning objectives and the methodology used
- quality of the problem solutions under the practical headings
- practical experience and qualification obtained from simulation
- nature and appropriateness of student collaboration and group working potential

The evaluation currently applied consists in a continuous assessment throughout the exercise lessons. As all the exercises involve both the compulsory and the optional items, a learner may obtain additional scores if he/she implements the optional parts. The scoring principle assumes obtaining one score for each solved problem.

The classroom discussions and talks are used regularly as a substantial instrument of learning monitoring and students' evaluation. To ensure students' preparedness for a lesson, a teacher asks usually 5 to 10 questions before, during, or after the simulation. Students are asked to search answers to the questions that were preliminarily published. Every correct answer increases the trainee's personal rating thanks to the simple scoring rule.

Analyses of the in-class evaluations have resulted in the following:

- some learners tend to approach the minimal mandatory level whereas most of them rush the maximal score
- the reason of low scoring lies in the difficulty in the understanding of many physical phenomena that requires additional time and knowledge
- the low-motivated students are more passive during the exercises, therefore special attention to this group is needed
- there was found an evident dependence between the exercise scores and the final examination grades

VI. Analysis and Discussion

Some self-assessment results are represented in Fig. 2.

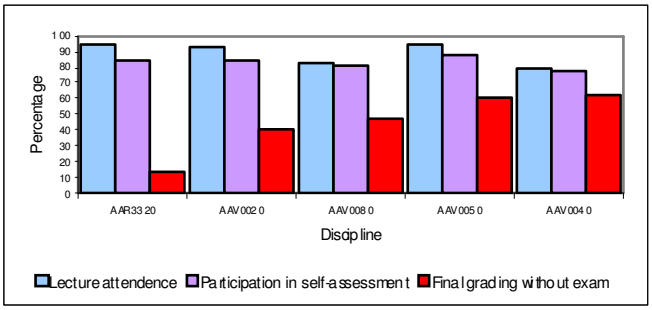

Fig. 1 Analysis of self-assessment

Here, three categories of engineering students are compared among about 250 learners. The first one (around 100 students of AAR3320) represents three second-year bachelor groups without any preliminary experience in active learning. The second category (35 students of AAV0020 and 75 students of AAV0080) represents four third-year bachelor groups who have enough skill in self-assessment. The third category (15 students of AAV0050 and 12 students of AAV0040) involves

two master groups who have both the learning and the professional experiences. The diagram shows the results obtained in 2013/2014 academic year.

The first important observation concerns the lecture attendance. Traditionally, this index drops with time because lecture visiting is optional in the university. In our case, the attendance in the frame of self-assessment remains persistently high weakly depending on the quizzing method, whether it is online (AAV0080, AAV0040) or on-lecture (AAR3320, AAV0020 and AAV0050) quiz. It seems especially important for the master study where the students have to attend classes along with their professional work.

At the same time, participation in the self-assessment increases in progress of learning in all forms of lessons, whether it is lectures, labs or exercises. To the end, all the attendants visit the classes for the sake of self-evaluation.

The third columns in Fig. 1 represent the most remarkable result that is the student's experience in self-assessment also increases in progress of learning. In this way, the targets of learning are reached thanks to the proposed approach.

VII. Conclusion

A self-assessment methodology in the scope of active learning electrical engineering promotes a development of theory appreciation, problem solution skills, effective circuit computation, experimentation experience, practical training, and acquisition of qualification. Analysis of students' participation in self-assessment, their lesson attendance, and final grades show that the proposed approach successfully contributes to the progress in the specialists' preparation.

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Academic Self-Regulation in the Context of Education in Early Adolescence

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Abstract In the last ten years, academic self-regulation research has brought important findings concerning motivation and self-regulation in the learning process, which are applicable in practice (school environment). Research conclusions of a number of authors have indicated that intelligence and the ability to retain information alone are not enough for success in school, and that it is necessary to engage adequate motivation processes and possess the ability to intentionally regulate one's behavior toward reaching academic goals. The results of the presented study point to the importance of supporting the development of academic self-regulation in early adolescence, since a high level of self-regulation at this developmental stage is an important predictor of later success in school, work, social relations and life in general (see bellow). The results of this research with a sample of 363 adolescents have indicated a number of interesting correlates, which should be reflected in the manner of preparation at school and at home of children at this developmental stage.

Keywords self-regulation, early adolescence, protective factors, gender

I. Introduction

THIS study is part of a broader research project aimed at understanding the developmental trend in an individual's self-regulation development in the context of coping with stress, self-efficacy and self-esteem, while studying select correlations of academic self-regulation in adolescence.

Self-regulation is a multidimensional construct consisting of a number of complex processes allowing the individual to adapt to the demands of the environment (Blair & Diamond, 2008). The ability to behave in accordance with social norms and regulate one's behavior to focus on a set goal begins forming in early childhood and continues throughout the cognitive development and socialization period. Since an adequate development of the ability to self-regulate is an important predictor of later success in school, work, social relations as well as life in general, it is crucial to focus on its development from the very beginning and understand it in association with all important factors, which influence the way self-regulation evolves (Baltes, 1997; Bandura, 1991; Blair & Diamond, 2008).

Self-regulation is usually divided into intentional self-regulation, which is characterized by goal-oriented behavior and develops throughout life, and organismic self-regulation, which is innate, functions on a biological basis, and involves all physiological structures and functions of the organism (Gestsdóttir & Lerner, 2008; Lerner et al., 2011). The main theoretical background of this study is the SOC self-regulation model (Selection, Optimization, Compensation) created by Baltes and his colleagues (1997), which describes three specific self-regulation mechanisms, used by an individual to dynamically regulate his/her behavior throughout the entire life. This model creates a key theoretical framework for the study of human goal-oriented behavior in the context of its development throughout the entire lifespan. The SOC model presents development as the result of an interaction between an individual and all the levels of the environment, thus, including the individual aspects of self-regulation, such as focus of attention, cognition and behavior (Gestsdóttir & Lerner, 2008). The SOC model also describes the relationship between goal attainment and outcomes of the development (Freund, Baltes, 2002). In this model, Selection is the first step in the self-regulation process, where the individual sets his/her goals. Optimization is the following process, during which new knowledge and skills are gained, leading to the enrichment of resources. Optimization is determined significantly by the environment, which sets the limits of its development. Finally, Compensation allows for reaching the goal using an alternate solution or changing the goal altogether.

The main self-regulation ability develops over the first two decades of life and the changes that occur during these years can determine the direction of its future development. In the early adolescence stages, an individual gradually acquires the necessary mechanisms to utilize intentional self-regulation, in terms of behavior regulation and attaining long-term goals. Self-regulation in adolescence becomes more cognitional, focused, efficacious and intentional. In early adolescence, it is still mostly insufficiently structured but it does appear as one factor, the global SOC, while during the period of middle adolescence, it gradually begins to differentiate into the three above mentioned self-regulation mechanisms. At the end of this stage, a fourth mechanism appears and that is the Loss-Based Selection. All four of these mechanisms function in a dynamic symbiosis throughout the course of the entire further development (Lerner, Gestsdóttir, Bowers & Napolitano,

2010).

Since the most recent research, mapping the development of self-regulation in adolescence, proves a correlation between positive self-regulation development and parenting style (Bowers et al., 2011), we decided to focus the present study on this aspect, which is in accordance with the primary research goal – academic self-regulation. Thus, the study concentrates mainly on intentional self-regulation – academic self-regulation, which functions as a conative component of the self-system. Our research aim was inspired by the work of Lee, Lee & Bong (2014), who tested a hypothetical model of academic self-regulation as described by the SOC model. In an academic environment, Selection (S) represents setting a study goal, Optimization (O) represents behavior enabling this goal attainment, and if reaching the study goal is not possible then Compensation (C) is the next process, or choosing an entirely new goal - Loss-Based Selection (LBS). Compensation corresponds to an individual's behavior directed toward attaining a goal using a different approach (e.g., ask the parents for help). A new selection, necessitated by unsuccessful reaching of the original goal, represents a selection of a new goal (Geldhof, Little & Hawley, 2012).

Based on the facts discussed above, we are of the opinion that the exploration of academic self-regulation can contribute significantly to the optimization of the strategies involved in school and home work with adolescents during this developmental stage, because a well developed ability to utilize and harmonize these self-regulation mechanisms at an advanced level predicts a positive development of the individual (Gestsdóttir & Lerner, 2007).

II. Methods

For the purpose of this research study, we used a quantitative research design implemented by means of a one-time questionnaire survey using a combination of questionnaire methods. The study is partially of an explorative character because some of the tested realities have yet to be empirically verified.

A. Research Aims

The goal of the present study was to map the level of self-regulation mechanisms within the framework of academic self-regulation during early adolescence. In addition, we aimed to verify possible correlations between the SOC level in the academic domain and, thus, examine how adolescents in this developmental period perceive their parent's autonomy support, involvement and warmth. One other partial goal was to map possible gender differences in these correlations.

B. Research Methods

The present study utilized the following questionnaire methods:

One's own Composition Questionnaire – determines demographic data about the participants, their parents and select realities relevant to our research goal, such as, family circumstances, preferred ways of spending free-time with parents and alone, school aspirations and school success, etc. The participants answered by free responses, multiple-choice responses or using a Likert scale.

The SOC Questionnaire – Academic Domain (Geldhof, Little & Hawley, 2012) – this is an adapted version of Baltes' SOC questionnaire (1997), which the authors created for measuring SOC in adolescents. It consists of 28 items, which are unequally distributed into 4 subscales (Selection, Optimization, Compensation and Loss-Based Selection). Within the framework of the specifics associated with the developmental stage of adolescence, the authors changed the qualitative character of the Loss-Based Selection scale: in this age group, they consider the mechanism of a loss to be lack of success. In our sample of participants, the individual scales as well as the overall score of the questionnaire was internally consistent (Cronbach's alpha 0.586 - 0.871), except for the Selection scale, which consists of 5 items only (Cronbach's alpha 0.586).

Perception of Parents Scale (Grolnick, Ryan & Deci, 1991, cited in Robinson, 1994) – this scale was originally designed for children but it was revised for the age group of adolescents and it comprises two original subscales: Autonomy support and Involvement. A third subscale was added called Warmth, which reports how the adolescents perceive warmth on the part of their parents (i.e., emotional relationship). The questionnaire contains 21 items pertaining to the mother and 21 to the father. The internal consistency was very good in our sample (Cronbach's alpha 0.786 - 0.839).

C. Procedure

The research data was collected using a one-time questionnaire survey presented at a select number of primary schools in the Czech Republic. The battery of tests with identical instructions was administered by a trained employee. The anonymity of the participants and the ethical approach of the research, were maintained. After processing of the data, all the participating schools were presented with the final report of the results.

D. Research Sample

The participants were students from 6th to 9th grades (aged 11-15 yrs., m=13.9 yrs., sd=0.93 yrs.) attending a common primary school. The resulting research sample comprised 363 participants, 207 girls (57%). 21 questionnaires were excluded on account of lack of participant cooperation or a greater number of items in a row being scored the same stereotypical way.

E. Data Processing Method

Gender differences in the self-regulation level were determined using the t-test for independent samples. Correlations between the scales of the Self-regulation questionnaire and other variables were verified using nonparametric Spearman's correlation coefficients (on account of the significantly slanted distribution of the variables measuring School Results, School Aspirations and Parenting Style scales).

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III. RESULTS

For clarity reasons, we are presenting a summary of the key results of this partial section of the main research aim:

Academic self-regulation level

Table 1. Comparison of scores in SOC-A scales

scale	*sample*	*mean*	*sd*	t_{361}	*p*
Selection	chlapci	20,5	5,1	-2,25	≤ 0,05
	dívky	21,7	4,4		
	celý soubor	21,2	4,8		
Optimalization	chlapci	47,2	9,2	-1,88	ns*
	dívky	49,0	8,1		
	celý soubor	48,3	8,6		
Compensation	chlapci	37,7	8,3	-2,79	≤ 0,01
	dívky	40,0	7,4		
	celý soubor	39,0	7,9		
Loss-Based Selection	chlapci	21,6	5,5	-0,48	ns*
	dívky	21,9	5,3		
	celý soubor	21,7	5,4		
SOC_A total	chlapci	127,1	21,6	-2,28	≤ 0,05
	dívky	132,3	18,9		
	celý soubor	130,1	20,2		

*ns = non-significant difference

Relationship between attained school results and academic self-regulation level

It is evident from the results presented above, that the correlations between all the scales of the Self-regulation questionnaire were not very close, except for the Compensation scale (see Table 2). The closest correlation was evident in the case of the Optimization scale. Higher level of self-regulation correlated with better school results, with the exception of the Loss-Based Selection, where higher scores meant poorer school results.

Relationship between school aspiration level and academic self-regulation

Similar patterns of correlations as the ones above, except that in this case they are closer, can be observed between the self-regulation level and school aspiration of the students. Once again, the closest correlation was found with the Optimization scale. On the other hand, no correlations, or only very slight ones, were found between the students' academic self-regulation and perceived aspiration of their parents.

Table 2. Spearman's correlations between Academic Self-regulation scales and School Results and School Aspiration

scale	*school results*	*students school aspiration*	*perceived aspiration of parents*
Selection	-0,230**	0,444**	0,071
Optimalization	-0,255**	0,518**	0,149**
Compensation	-0,057	0,247**	0,047
Loss-Based Selection	0,140**	0,080	0,084
SOC_A total	-0,168**	0,441**	0,128*

* p≤ 0,05; ** p ≤ 0,01

Correlation between parents' education and academic self-regulation level

None of the correlations between Self-regulation scales and parents' education level were statistically significant. In our study, parents' education level did not influence school aspiration, neither in the case of the students nor the parents. The only significant correlation we found was with school results (0.140), which most likely is the effect of an inherited component of intelligence. It must be mentioned, that a large portion of our sample of parents consisted of individuals with secondary (39% of the mothers, 46.6% of the fathers) and university education (40.2% of the mothers, 37.6% of the fathers).

Correlation between academic self-regulation and parenting style

Table 3. Spearman's correlations between Academic Self-regulation scales and Perceptions of Parents scales (mother/father)

scale	*Involvement*	*Autonomy Support*	*Warmth*
Selection	0,185** 0,188**	0,123* 0,105*	0,144** 0,114*
Optimalization	0,300** 0,318**	0,239** 0,247**	0,258** 0,227**
Compensation	0,276** 0,254**	0,257** 0,247**	0,291** 0,247**

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Loss-Based Selection	0,007 -0,004	0,062 0,022	0,052 -0,007
SOC_A total	0,291** 0,299**	0,258** 0,253**	0,285** 0,228**

* p≤ 0,05; ** p ≤ 0,01

We found that the Parenting Style scales did not correlate very closely with Academic Self-regulation scales. The strongest correlations were found with the Optimization and Compensation scales. On the other hand, no correlations were found for the Loss-Based Selection.

Additional interesting conclusions

The study yielded a number of additional interesting results, of which we consider important to mention at least the correlations between the level of academic self-regulation and free-time activities of the children, even if these correlations were usually weak (around 0.150). There was a positive correlation between time spent on homework and time spent in extracurricular club activities, and a negative one with time spent on the Internet and playing computer games. A significant difference was found in the manner of spending free time between children living in a household with or without a father. Children with a father absent from the household spent significantly less free time involved in sports and extracurricular activities and more time than the other children on the Internet and playing computer games.

F. Limits

The limits of the study arise from the design itself, which utilized the self-reporting questionnaire method and from the selection of the research sample, which was not representative. Moreover, it is also possible that superintendents of schools, which have generally reached good results, were mostly the ones to agree to participate in the study.

IV. DISCUSSION

Examining the results of current research leads us to assume that during the stage of adolescence self-regulation mechanisms undergo a dynamic development. At first, these mechanisms are unstructured (Gestsdóttir & Lerner, 2007) but during the development throughout adolescence they gradually become relatively significantly differentiated. Initially, parents are the ones who determine the children's goals; in many areas of their lives they are being lead by their parents. However, in the course of a complex process of growing up these self-regulation mechanisms become gradually differentiated and the adolescents become autonomous individuals. This developmental trend is supported by the results of our study, where we found that a higher level of academic self-regulation did indeed correlate with better school results but in the Loss-Based Selection scale, higher levels correlated with poorer school results. This self-regulation strategy is the result of unsuccessful attainment of the original goal and represents the choice of a new substitute goal. This conclusion corresponds to the research results of a number of other authors (Geldhof, Little & Hawley, 2012, and others) and indicates that the self-regulation mechanisms in early adolescence are not yet as matured as to allow for optimal utilization and effective attainment of the determined goals. Given that, our research found interesting gender differences, where girls attained higher levels of overall self-regulation, even in some utilized self-regulation mechanisms such as Selection and Compensation.

Similar, but statistically more significant correlations, were found between self-regulation level and the students' school aspiration. The closest correlation was found with the Optimization scale. Lee, Lee & Bong (2014), who verified a hypothetical model of academic self-regulation, as described by the SOC model, note that the Optimization scale represents behavior, which makes goal attainment possible (doing homework, preparing for school, etc.).

On the other hand, no correlations at all, or very weak ones, were found between academic self-regulation and perceived aspirations of the students' parents, which indicates that children's perceptions of their parents aspirations do not influence their own school aspirations to the extent that we would expect.

A number of research studies carried out on self-regulation in adolescence have concluded that some demographic data pertaining to the parents, such as their education, do partially affect the level of self-regulation of their children. According to these studies, children of parents with a higher education (mainly mothers) are better equipped with self-regulation mechanisms in the social as well as school environment (Piotrowski, Lapierre & Linebarger, 2013). Higher education of the parents, according to professional literature, is then generally understood as a positive predictor of a high quality level of self-regulation behavior of their children. However, in our research sample, the parents' education affected neither self-regulation nor school aspiration, of the students' or the parents'. The only significant correlation of the parents' education was found with school results, which is most likely due to inherited components of intelligence. Namely, the majority of parents in our sample had secondary or university education and, therefore, we were not able to find the above-mentioned correlations, perhaps because of a low variance of the variables. Our results, however, can point to possible relationship between the self-regulation mechanisms and the level of maturity of adequate cognitive predisposition. Here, learning by example can play a significant role in acquiring self-regulation mechanisms from parents because parenting style represents the means of parents influencing their children, teaching them to regulate their emotions and behavior (Kiss, Fechete, Pop &Susa, 2014).

Parenting style, such as whether and in what way both parents take part in the upbringing of the child, undoubtedly plays an important role in the development of self-regulation (Grolnick & Farkas, 2002; Grolnick & Ryan, 1989). Parenting style scales in our research sample manifested relationships with academic self-regulation scales that were not very close, however, the strongest relationships were found in case of Optimization and Compensation scales, which are very positive self-regulation mechanisms. On the other hand, again we found no correlations with Loss-Based Selection, which supports our previous statement concerning an unequal development of individual self-regulation mechanisms.

Last but not least, we must mention the time which parents spend with their children during which they transfer their own self-regulation abilities and strategies (Gillernová, 2009). The correlations that we have identified between the level of overall academic self-regulation and free time activities of the children were predictable to a certain degree. Thus, the relationship of self-regulation with time spent on homework and extracurricular activities was positive and with time spent on the Internet and PC games it was negative. The choice and particularly the preference of free time activities undoubtedly also affect the development and forming of an individual's identity (Barber, Stone & Eccles, 2005; Eccles et al., 2003), because through them the development of self-regulation mechanism is either potentiated to a certain degree or inhibited.

Also, a significant difference in the manner free time was spent was found between children with a father present or absent in the household. Children with an absent father spent significantly less free time doing sports or participating in extracurricular activities, and yet they spent more time on the Internet and playing computer games than the other children.

In our opinion, the above presented results are a contribution to the comprehension of the concept of the development of self-regulation in early adolescence, and their significance lies mainly in their application directed to the support of the development of self-regulation mechanisms of children in this developmental stage, because self-regulation ability is certainly an important predictor of further positive development (Gestsdóttir & Lerner, 2007).

V. CONCLUSIONS

Theories of successful life direction, particularly the SOC model (Baltes, 1997), which in the context of intentional self-regulation perceives each individual as an active agent participating in his/her own further positive development form the basis for our study. Academic self-regulation can be viewed from the same angle, since self-regulation in the context of learning is not an innate ability. Self-regulation in learning can be learned. Its formation and development is influenced by, besides personality characteristics and cognitive predisposition of a given individual, parents, teachers, other adults with whom the individual comes into contact (e.g., free time activities), siblings and close friends (Zimmerman, 2002).

Self-regulation development, particularly academic self-regulation, is a key factor in adolescence because a successful development of self-regulation mechanisms, specifically during this developmental stage, affects to a significant degree the successful life path of the individual.

In our research sample, higher academic self-regulation level correlated with better school results and higher school aspirations of our participants. Unexpectedly, however, their level of school aspirations was not influenced by their parents' education level and the parenting style was in a rather low correlation with academic self-regulation scales, which corresponds to the broader context of an individual's development, who during this stage of adolescence is undergoing the process of gradual separation from the parents. This developmental trend in the evolution of self-regulation mechanisms is supported by our findings of a correlation between the overall level of academic self-regulation and intentional free time activities of our adolescent participants and interesting gender differences in the preferred strategies of academic self-regulation.

In our opinion, the presented findings can play a key role in the targeted protective work of teachers as well a parents, because their efforts in the development of the ability to effectively utilize all self-regulation mechanisms of adolescent individuals are reflected, in a significant way, in their further positive development (Gestsdóttir & Lerner, 2007).

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Psychological, sociological and legal aspects of integration into society of orphans in order to prevent deviance and delinquency

Diana Gorun

***Abstract*—**Any social community bases its structure and functionality on an ethical, legal and cultural model, consisting of values, norms, rules and duties, which ensures the stability and continuity of society and avoids tensions and conflicts between individuals and social groups. The children are affected if they cannot integrate into society, culminating with the deviance and delinquency phenomena.

All children need adult protection to exercise their civil rights and freedoms. United Nations Convention on the Rights of the Child of 1988 provided protection of institutionalized children. However, these children have specific needs which justify the reiteration of certain rights and defining others specific to their situation.

The proposed solution to the problem is the social integration for orphans through sport and education, with the consequence that minors will not feel marginalized by civil society and thus they will find their purpose in life.

***Keywords*—**Society, social order, social integration, anomie, deviance, delinquency, orphans, education

I. INTRODUCTION

The organization and functioning of any society, the cohesion between its structures and institutions depend essentially on the consensus and conformity of individuals and social groups with ethical, legal and cultural model. This model consists of a set of values, norms, rules and duties which are meant to ensure stability and progress of society.

Various forms of social organization, human communities and social groups are relevant and have an important role in people's lives, as well as in determination the individual and group behavior, including the complex mechanisms of individual - community - society relationship [1].

In the formation of the individual human personality which will become a member of the community and society, the family has a very important role.

The family is the institution that directs the formation of the child's personality and contribute to integration into society as an adult.

It is obvious that for orphans or for children from troubled families (raised by only one parent, with parents working abroad or with criminals parents etc.) the family's role in guidance is greatly diminished, practically nonexistent. Moreover, these children face difficulties in social integration.

In the process of socialization, learning and practicing proper roles of individuals, knowing and obeying to social norms contribute to the stability of the social system. All these elements of social connection facilitates the efficient function of the whole society, while ensuring the social integration of individuals [2].

II. PROBLEM FORMULATION

From the sociological perspective, the social institution is a set of organized social relationships based on shared values and certain methods that are used to meet basic social needs of a social community.

All types of such systems have main institutions that govern/rule all the significant areas of life of the community, such as economic institutions, legal, political, cultural, educational, religious, etc.

The analysis of the structure and functioning of institutions allow understanding of social cohesion and thus the functioning of society [3].

2.1. Law, factor for achieving social order

Any social community bases its structure and functionality on an ethical, legal and cultural model, consisting of values, norms, rules, duties, customs and usages, which ensures the stability and continuity of society and avoids tensions and conflicts dysfunctions between individuals and social groups that compose the community.

The characteristic of this model is that social values are central, embodying, in fact, the most important traditions and customs of a society, characterizing its own culture.

Representing a reference point for individuals in different social contexts, rules indicate what is right and wrong, lawful or unlawful, legitimate or illegitimate, thus establishing the permissiveness of action and behavior.

Pointing out that as part of the social order, social sanctions acquire a high degree of accuracy, regularity and systematization, Emile Durkheim was tempted to see in them the main means of achieving social constraint.

Taking into account the nature and form of sanctions and how they may develop, it is considered that they may be:

-positive - organized (consisting of various ways of expressing public gratitude for deserving individuals - prizes, awards);

-positive - unorganized (including reactions of certain groups of belonging - family, friends, school, etc. - or public opinion against individuals whose behaviors are consistent with the value system of the group);

-negative - organized (based on coercion and correction - performed by specialized institutions such as the police - which are punishable by deviant and delinquent behaviors);

-negative - unorganized (consisting of verbal rejection expressions - contempt, ridicule, etc., or moral condemnation, exclusion and marginalization of different behavior non-concordant with the rules of the group) [4].

Including a set of rules, requirements, constraints, obligations, rights and responsibilities, social order is a necessary but not sufficient condition for the stability and functionality of the social system and for the cohesion and safety of individuals and social groups. The social order must be completed by the normative (legal) order, which includes all the norms, rules and regulations developed by legitimate authority (public) legislation governing the various actions, individual conducts and social behaviors.

Being a category of social norms, legal norms protect the most important values and social relations by establishing a system of correlative rights and obligations between individuals, groups, institutions and social organizations. They have a number of common features as social norms and that is why some authors, lawyers and sociologists have been tempted to believe that all social norms are legal. This concept extends, however, artificially the field and purpose of the norm, ignoring the fact that if it is true that all legal norms are social, not all social norms are legal. A criterion for the distinction of social norms is that of public authority, which is official, legal and legitimate from which legal norms emanate.

Regardless of the diversity and the area it covers, the legal rules represent those rules with well organized sanctions, likely to be respected and implemented using coercive force or pressure exerted by the public authority. Legal sanctions may be, based on values and social relations protected by the rule of law, civil penalties, disciplinary, administrative, criminal, etc. Among them, the criminal are the most coercive.

Law is an important factor of social integration and includes rules and regulations relating to the roles that individuals must accomplish or play them in different contexts.

Evaluation of the social functions of law must consider two types of phenomena:

a) those in the political sphere, called forms of power or authority;

b) those under power or under its authority, within the sphere of the governed;

The problem of social order and normative includes three important aspects, which are interdependent:

a) the necessity that all individuals, groups, institutions and social organizations in society comply with all the legal norms (which is the supreme principle of existence and functioning of society);

b) the necessity of existing a series of means of coercion and social control through which behaviors are approved or disapproved;

c) the necessity to maintain the social order and normative order, by sanctioning and punishing behaviors that violates or infringes the expectations of most individuals [5].

2.2. The concept of "social order" and "deviance"

Sociology of Deviance is a relatively new discipline in all other branches of sociology. Its fundamental paradigms were developed only at the end of the third decade of the previous century, although its theoretical premises can be identified in the history of modern sociology with the inclusion of its concerns in the area of social normative, issues as the relationship between time, value and social behavior. As any society can be defined by the rules and values that distinguish it from other, their presence contributes to the establishment of a state of balance and harmony relative designated by the generic term "social order". But such a state is not final, as there may appear anytime conflicts between values and violations of norms, which is characteristic to the phenomenon of "deviance". This consists in the deviation acts of individual that deviate from the requirements of the normative and value orientations socially dominant [6].

The lack of clear legal standards and normative systems Tensions between individual perplexing. Different types of antisocial behavior are generally the product of social conditions called "anomie", characterized by the absence or conflict of norms.

Anomic states usually occur after social events causing dislocation of social structures (revolutions, for example) and social anarchy.

For Emile Durkheim it is just, moral, legal and legitimate everything is a source of social solidarity which binds them all individuals between them and it is immoral, illegitimate, illegal and unjust everything against solidarity and social cohesion, whatever violates the norms and values accepted by most individuals and social groups [7].

From this point of view, the law itself ceases to be a source of solidarity and social cohesion at times of economic crisis, revolution or natural disaster situation Durkheim defined by the concept of anomie (from the Greek "*a nomos*" meaning "lack of rules").

According to Durkheim, the anomie is characterized primarily by damaging the collective consciousness, by decreasing sensitivity of morality and leading to normative disorder. It is the state of social disorder and normative society is troubled by a painful crisis or transformation happy, but too suddenly, becoming unable to exercise authority over individual. Anomie is not a state defined by the total absence of rules, but a social situation in which the basic rules, including legal, temporarily suspends its functionality, resulting confusion and disorientation among individuals and social groups, leading to increased deviance and crime

phenomena. For these reasons, anomie is a potential source of deviance and crime in many changing societies.

The concept of anomie has helped defining "*pathological evil*" of modern society and has allowed the most consistent interpretation of the phenomenon explanatory crisis, on the one hand, and deviance, on the other hand.

American sociologists have developed a theoretical model of anomie, different from the context in which the term was used by Durkheim. The first and most representative American sociologist who helped to enrich and diversify the concept of anomie, but in a different sense from that given by Emile Durkheim, was Robert K. Merton [8]. From his point of view, the society has from individuals two fundamental moral requirements:

a) to choose the finality of their actions for cultural purposes only desirable, acceptable to the whole society;

b) to select of all the means at their disposal to fulfill the goals, only those which are institutionalized, so legitimate.

Merton believes the gap between cultural goals and legitimate means as a primary source of anomie. Consequently, some individuals get to use illegal means to achieve personal goals, engaging in deviant acts with the consequences of affecting social order and offending the collective spirit.

The most frequently significance given by American sociologists for the concept of anomie was the "desocialising", consisting in the absence of normative and value orientation of individuals as a result of being placed in a social environment characterized by the existence of conflicting normative systems.

Robert Park was another author which has built a theoretical model of marginality, which includes the following features that define the marginal individual situation:

- social isolation, lack of communication, due to the low frequency of relationships between individuals;
-social distance, rare contracts between individuals determined by an objective state (such as social isolation) and one objective (for example, racial prejudice);
- cultural and social segregation;
- attitudinal ambivalence;
- social maladjustment;
- uncertainty, insecurity and anxiety felt and expressed by individuals, due to the absence of normative indications [9].

The consequences are dramatic for the establishment anomic state: the social forces released - a dangerous freedom - are no longer necessary balanced, the value is undetermined, nobody knows what is possible and what is not, what is right or what is wrong, ignores the difference between claims and expectations, collapse earlier principles governing the social order. Acting as powerful factor of disturbance, anomie is always facilitating unleashing forces and wills of individuals to exercise their action beyond the limit imposed by the normal relationship between individuals and society.

In 1956, Leo Srole achieved the best known and still used model of measurement of anomie. Srole proposed an attitude scale comprising five questions that define how is perception of the individual about the society and how influences the individuals an environment characterized by "social dysfunction". The types of questions internalized images of individuals in relation to social disruption and anomie environment are

1. "Do not use too much to write because officials are not really interested in the problems of ordinary people", meaning indifference to the fate of human authorities.

2. "Today a person should live more for now and leave the worries for the future", meaning that the social order is unpredictable and erratic.

3. "Despite what some say, most people are doing increasingly worse, not better". The significance is that personal goals are not achievable.

4. "It is not fair to bring children into the world at a time when things cannot be seen in the future". In another words, life is meaningless.

5. "Today, no one really knows who can count on". It is obvious that the meaning is that support and dependence on man or mankind are absent [10].

For Srole, unlike Durkheim (which referred to the state of society) and Merton (which took into account the social structure), anomie represents primarily a subjective condition, which reproduces the inner level of the social environment dysfunctional characters.

2.3. Anomie and social changes in present Romanian society

Applied to the reality of Romanian society, the concept of anomie seems to suggest that, unlike previous totalitarian period, characterized by excessive regulatory pressures, absolute compliance requirements of individuals and good social integration, the current period is characterized by:

1) weak and contradictory normative pressures;

2) the absence of adequate coordination of social system functions caused by the existence of divergent normative guidelines determined by the conflict between the old and the current rules;

3) the low level of social integration determined by focus increasingly more on the values of individualism and the hard competition required by the market economy.

As it is known, during the period after December 1989 were repealed or amended several laws and regulations. In their place were developed more. This process occurs during the transition from one regime to another and in line with the requirements of creating a compelling state. But such a process has its own limits, generating excesses or errors.

Delinquency is significantly influenced by the state of social anomie that characterized our society in the years after the Revolution of 1989. Therefore, the development of predictive models on crime trends etiological and our society must consider the profound transformations and mutations that occurred after 1989, which resulted in a true "rollover" values, our traditional patterns and institutions on socialization and social control made in groups such as family, school, friends, local community etc. It is therefore necessary to "radiography" the economic, social and cultural rights, in order to develop social assistance programs to "revive" the traditional functions.

2.4. Social and cultural definitions of the phenomenon of deviance

Deviant behavior, as deviation from social norms and values base, is a common phenomenon in all societies, from the first organized forms of social life to the contemporary. Every society judges the behavior of its members both in terms of its intrinsic motivations, and especially in terms of compliance with this behavior universally recognized norms and values. Thus complying with the general rules manifests itself as a "normal" trend , assessed positively in the group, while deviance is a impermissible trend, "abnormal", negatively valued because stumbles the normal progress of a group life [11].

Through the process of specialization, any society transmits to its members its normative and cultural model, consisting of all social norms and values. Socialization is such a fundamental process that facilitates the integration of the individual in society by "learning" an important part of the group culture and by assuming the social role required by group.

Taking as reference some model of personality, considered goals in a given society, socialization process has triple functionality (psychological, social and cultural), consisting of internalization of norms and values.

As a result of this process, the individual trends show strong adherence to group norms and values which socialized him, and society, in turn, considers individuals after this standard, waiting for it to show predictable behaviors.

This voluntary "imitation" of patterns taken by a society is called concordance, whereas the opposite of it is called deviance, which can be defined as a lack of adherence to the norms and values of the group or as a violation of normative prescriptions indicating how it should be individual behavior in a particular social situation.

Sociologists define deviant behavior as a typical one, because it violates social norms and violates recognized institutional requirements, conflicting with social and cultural standards accepted in a group or social system.

In any society, deviant behavior covers a wide variety of so-called "eccentric behavior" to "dysfunctional behavior", which entered the area of delinquency, mental disorders, deviant subcultures and countercultures or marginal ones.

Deviant behavior can be understood in two ways: either the product of "functional disability" of the individual, or as the product of a perfectly normal behavior, but incompatible with the standards of "normality" of the group. In this second case we are dealing with situations of social maladjustment and not integrating, materialized with the rejection of group norms (protest), avoidance or norms innovation. The nature of deviance can be of character and also social, due to environmental conditions. Moreover, sociologists distinguish between "positive deviance" by which one deviates from the average standards, stereotypes and social conformism and "negative deviance", by which the individual refuses, violates or circumvents the norms indications.

2.5. Deviance as a social phenomenon. Social order and deviance

As a fundamental social process, socialization and integration ensures both homogenization behavior (the ability of individuals to cope with social situations to be confronted and effectively play the roles learned) and homogenization of social life (through its development after the preset patterns behavior, depending on the conjunction of different social roles).

A deviant conduct constitutes in a misconduct of the unanimous recognized rules or expectations required by others, conduct that violates the standards of normality in the group or social system.

The relationship between legitimacy and criminality is shown as below:

Legitimacy

-control and social integration: respect the values set by laws, codes, regulations

-compliance: compliance with norms and values, assumption of normality

-social organization :accomplishment of values, goals.

Criminality (delinquency)

-offences: deviance from the norms established by the criminal law

-deviance: infringement on different statuses

-social disorganization: failure to achieve certain values, goals.

In order to function properly, any human society as well as any community or social group) needs to impose some regulation of behaviors, actions or relations, the so-called "social order". This implies the existence of a body of laws, regulations and rules that require individual a certain behavior, depending on the social situation in question.

Fitting into to such a social order, the individual expects the society to offer him a number of means, resources and conditions to enable compliance with the requirements of society and creative participation in society.

Thus the problem of social order appears closely related to the following three aspects (the first two are mandatory):

-the need for education, by modeling a certain type of behavior that conforms to social demands;

-the need for means by which any behavior that exceeds "normal" roles has to be repressed and punished;

-the possibility to appear undesirable behaviors that deviate from the requirements respecting social order.

The first aspect is the essence of the process of socialization, the second represents the quintessential social control process, while the third, being the subject of many disciplines (sociology, psychology, criminology, forensics), represents the phenomenon of deviance.

2.6. Deviant behavior as a "social problem"

Most theories developed in Western literature on the causes and conditions of deviant behavior falls within the vast group of individual pathology and social theories, social disorganization and conflict of normative. But currently, there is no single theory of social problems, but also many theories

that, without avoiding the relationship between individual and society, give an important role either to the individual or to the society in generating deviance. Among them, there are theories that consider deviance as a consequence of social disorganization occurred as a result of changes (such as revolutions). Other theories claim that social problems are caused primarily by "deficient" individuals that manifest inability to learn or accept normative models of society. In the mean while, according to other theories, social problems are a direct effect of normative conflicts between different social groups and organizational obstructions to access the status, power and wealth. Finally, there have been elaborated theories according to which social problems are based on the normative dimensions of social change projects; thus, trying to solve social problems by changing, it brings new ones, which frequently are even more difficult to solve than the original.

Highlighting the fundamental source of social problems pressing trends contradiction between social change and the need to integrate its deviant parts and its deviant members, the sociologists include between social problems those phenomena arising intolerable for any contemporary society which threatens its stability such as: delinquency, crime, prostitution, drug abuse, unemployment, corruption etc.

2.7. Sociality and delinquency. The concept and dimensions of delinquency

Representing the transgressing of social norms prevailing in a society, deviance includes those behaviors that deviate from accepted standards and normative values recognized in a particular social group or system. Therefore, the notion of "social deviance" (one of the most used in sociological vocabulary) designate non conformity, deviation or violation of social norms and rules. It includes all the behavior and expectations of behavior that violates institutionalized (those expectations which are shared and recognized as legitimate within a society). Deviant behavior is an "atypical" behavior, which differs considerably from the standard position of the society.

In the opinion of many authors, the phenomenon of social deviance is universal. Durkheim believed that "there cannot be a society in which individuals did not deviate more or less from the collective type". With a universal character, deviance is a phenomenon found in all societies, being generated and conditioned by many factors and general and specific causes, objective and subjective, social and individual. That is why assessment of social deviance is based on social values and social norms which are violated, harmed by some individuals or groups of individuals. As deviance is an expected phenomenon in the evolution of society, the individual should not be considered necessarily deviant antisocial or asocial element, but it is, according to E. Durkheim, "a regulating agent of social life".

There is a particular form of social deviance including a range of behaviors with a high degree of social danger because they infringe or violate criminal legal rules and norms that protect the most important values and social relations (those about life, society, family, property, dignity, state, society, etc.) This is delinquency (crime, criminality) which, unlike deviance, features the following:

- it is a social phenomenon, objective, material, but at the same time, antisocial and extremely dangerous;
- violates laws and legal regulations that prohibit the commission of certain shares;
- it is the manifestation of a behavior against moral rules and social life;
- it is also the manifestation of anti-social actions that endanger the safety of institutions and social groups.

Apparently, the offense appears to be only a juridical phenomenon, but in reality it is a complex social phenomenon that produces negative and destructive consequences in a society.

Using a synthetic formulation, delinquency includes those violations and breaches of criminal and social life which protect public order, individual rights and freedom, life, health and integrity.

Delinquency is a complex phenomenon, with the following dimensions:

1) a statistic dimension (highlights delinquency status in time and space);
2) a legal dimension (highlights the type of violated legal norms and antisocial acts, and social danger of the latter);
3) a sociological dimension (focused on identifying, explaining and preventing crime and social crimes);
4) a psychological dimension (highlights the personality of the delinquent individual);
5) an economic dimension (direct and indirect consequences of the crime in terms of material and moral);
6) a prospective dimension (highlights future trends in delinquency).

From a legal perspective, delinquent behavior is defined through a number of specific features that are found in most legal systems. These are:

a) the person commits an act (action or inaction) which is unlawful, immoral, illegitimate, illicit, prejudicial for the values and social relations;
b) the offense is committed by a person, which will be held criminally liable;
c) the act is criminalized and punished by the criminal law.

Although it brings many details of the assessment of delinquency, legally approached, from the standpoint of criminal law is not sufficient to provide enough elements for a thorough understanding of various types of criminal acts. It is necessary to be approached together with sociological and psychological analysis, with which to identify the socio-cultural and individual delinquency.

2.8. Social integration, way of preventing deviance and delinquency

In order to achieve a correct approach to the problem which is the subject of the present study, first of all it is necessary to identify the problem itself and to determine its causes and effects. However, the study aims to find a solution to the problem and the impact over target group level, through an interdisciplinary approach of the issue.

Since the analysis to be achieved by the study covers a group of children, we consider that it is necessary to give a brief presentation of the concept of social group.

Social relations are stable element of social bindings, resulting in the formation of groups. There can be no sustainable group, organized and united, without mutual interaction with social relationships.

The notion of social group designates different sets of individuals who share the same sense of unity and are engaged in one or more types of stable social interaction, depending on social and historical contexts. The group is an association of more people, in a relationship of mutual dependence and interaction in a common activity. The group develops norms and values that govern the behavior of all its members. For a number of people to be considered as a group, must meet several conditions:

-there is an interaction between group members, which is not mandatory to be a direct relationship;

-perception of membership - persons in a group must perceive themselves as members;

-sharing by those who belong to the group of the same rules;

-involvement, as far as possible, of all people that make up the group in the same events.

An important type of social group is the community, characterized as a restricted social unit, with a small number of members who personally know each other and have direct and intense reciprocal relationships based on strong traditional rules.

The society is a much larger social group and the individuals have indirect relationships which do not involve personal knowledge of each other [12].

The Romanian society encounters huge obstacles in the attempt to find the appropriate guidance and support for the children in need and orphans to integrate, first of all into small communities and finally into society.

Causes and effects of the problem identified are:

• family abandonment

• lack of education and adequate monitoring social system

• lack of social integration programs

• lack of material resources.

National and local campaigns on the situation of institutionalized children had positive results both in terms of raising awareness and in terms of awareness that all children need adult protection to exercise their civil rights and freedoms. United Nations Convention on the Rights of the Child of 1988 provided protection of institutionalized children. However, these children have specific needs which justify the reiteration of certain rights and defining others specific to their situation.

The proposed solution to the problem is the social integration for orphans through sport and completion of compulsory education.

The impact on the target group will be for the institutionalized orphans and the children in need that these minors will not feel marginalized by civil society and thus they will find their purpose in life.

In order to achieve this goal, it is necessary for the target group members to receive their form learning to adapt to a group, first one smaller and one larger gradually, and finally to succeed adaptation to society.

People who aspire to become members of a group, regardless of ethnic origin, sex, age, etc. can have different reasons:

- attraction for group activities;

- sympathy for members;

- emotional needs within the group. It is obvious that all these aspects must be considered and should be developed to target group.

The beneficiaries of the study can be classified into direct and indirect beneficiaries.

The direct beneficiaries will be the orphans, the children in need which are usually institutionalized in specialized centers. They are the first people who will benefit from the project by solving the specific problems and objectives, starting with physical and mental resilience on a micro and/or social macro group, culminating in integration into society.

The indirect beneficiaries are the members of the society, which in this way will not face socially dangerous situations, consisting of deviant behaviors from generally accepted standards of these children and young people, determined primarily by social inadequacy and inability to achieve personally and/or professionally.

The need for research and psychological profile of the child's personality arises from the complexity of orphan prevention, treatment and recovery of behavioral deviance. The initiation of a scientific research on prevention and recovery of behavioral deviance, based on the analysis of particularities of personality development stages of age - specific psychological and social help it to mature personality.

Inadequacy behavior of children and young adults mainly relates to disorders of relating to students concerned with schoolmasters, teachers and the school community or breaking the rules. The range of these disorders is wide, it includes both behavioral changes in relation to less serious legal (criminal) but troublesome, such as: false, inconsistent behavior, verbal violence, cheating in class, ostentatiously smoking, various non-conformist attitudes and serious violations of moral norms and criminal law, such as repeated vagrancy, burglary or robbery acts, the current consumption of alcohol or drugs, prostitution etc. Teachers usually faced with conduct disorders lighter than criminal behavior, but rather are widespread and severe deviations of conduct, which require more time and effort to be eradicated.

In the field of behavioral disorders the antisocial behavior occupies an important place. From this point of view, we find the following items, which must be identified early and, if it is possible, to be eradicated:

- tendency to aggression, whether latent or manifest, based on a background of hostility, denial of socially accepted values ;

- emotional instability generated by educational gaps;

- social maladjustment, coming from exacerbating insecurity, the individual seek to suppress it;

- duplicity conduct;

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- existential imbalance, expressed by vices, evil etc.

The teenager with antisocial behavior is an individual who apparently has a surplus of unpleasant experiences and feels uncomfortable living in a world threatening. His sense of self-esteem seems to be undetermined, so he does not lose anything if criticized or even imprisoned. Not having any defensible social status, fear of losing does not motivate him to strive to comply with social norms. Moreover, whether he had too many unpleasant contacts with other people, whether they consider all like, he does not appreciate others and therefore does not put too much value on others' opinion. This set of attitudes makes it very difficult to establish contact with him of trying to reeducate.

Tension over time due to frequent frustration will eliminate the sudden downloads by aggressive or self-aggressive forms of conduct.

Since the family environment plays an important role in educating and training young orphans, it is obvious that the absence of it dues to more antisocial behavior than for the children who have parents. The atmosphere of these children living in institutions, the lack of parental authority and control of their condition lead to social maladjustment. These children are characterized by:

• insubordination against the school rules and regulations;

• lack of interest in school requirements and obligations;

• absenteeism;

• repetition;

• aggressive behavior with classmates and teachers.

Recent researches show that there is a correlation between delinquent behavior and level of training school consisting in that juvenile offenders usually show a very low level of school education.

Skin manifestations of deviant usually result from the interaction of individual and social causes a number of favorable conditions.

To avoid such situations, we believe that social integration started as early and by involving institutionalized children in school activities and sports can have beneficial effects both in respect of the children themselves, as well as other members of society.

As an educational method which aims at solving both physical and mental, we propose team building, which is a concept that is based on the theory and practice of organizational development and can be applied to sports teams, school groups and so on. It is important in any field, its purpose being to highlight the best aspects of a team/group, ensuring the establishment of relations of positive communication, demonstrating the ability to adapt to group collaboration and capacity to solving a given problem.

The purpose of such a program is to stimulate talents, skills and creativity of the group members and to create a better collaboration and communication between them. It thus relies on the fact that the common objectives of the group will be done through collaboration between team members, each giving the game its specific talents and abilities.

Such a program offers the opportunity for the group members to become the "leaders", thereby enhancing self-esteem, developing the spirit of belonging to the team/group, which provides opportunities to educate young people through cooperation and mutual relationships. It is also very important is that a team building program type can counteract antisocial attitudes like criticism, insult, irony, negative pressure expressed nonverbally (body posture, look etc.).

In this process children and youth component of a team/group learn have to:

- to communicate effectively with other members;
- to become an effective team;
- to take the risk of expressing an opinion to the team;
- to act in accordance with the rules established by the group to support the team;
- to recognize the strengths and weaknesses of the team and use them to be successful;
- to encourage their colleagues in any type of difficult situations and to recognize the value they succeed
- to improve communication relations
- to establish effective collaboration
- to develop their perseverance, optimism, stress resistance, tolerance, acceptance and desire to succeed
- in terms of self, by understanding the feelings and reactions of others, changing attitudes towards themselves and the group by discovering tolerance, respect and trust
- awareness and social level by assuming the role in the team and increasing individual responsibility
- in terms of social organizations by increasing confidence in the value of the action group (team).

The diversity of personalities will make up the team members be able to question the different ideas much more than any member had taken separately, so the decision (choosing one of the best solutions identified) will be taken from a broad spectrum of possible solutions.

The objectives set includes creating a pleasant atmosphere to the place where the group operates, motivating the members to establish common purposes, learning rules, identifying and using strengths team members/group, improving team productivity etc.

Therefore, there's a positive morale influence upon individuals composing the group, prompting them to act more effectively. Efficiency sports groups evidenced by several important aspects, such as the ability of self-organization, coordination and cooperation relations, consensus and compliance, commitment to the group, spontaneous communication.

III. PROBLEM SOLUTION

SWOT analysis of the organization's ability to resolve the identified problem

We must take into account the influence of internal environment and external environment over the group.

Regarding internal environment, we identify the existence of the following strengths

3.1. Shares and positive qualities

• qualified personnel in sport, having the ability and power to identify certain “talents"

•qualified personnel in psychology and psychotherapy, with the ability and power to identify behavioral problems in order to avoid the emergence of deviant action type

• qualified personnel in pedagogy

• ensuring school attendance

• existence of adequate materials for school activities and sports

• support, including financial activities and sports school

• reduction and/or stopping in the juvenile antisocial phenomena

• central location with tradition in education

• attracting qualified personnel in the areas of pedagogy, sports, psychology, medicine, to do volunteer work

• psychomotor development of children orphaned by sports activities that will take place in the sports center.

Should be considered equally and weaknesses, consisting of actions and negative qualities such as

• the orphans reluctance for education

• the absence of specific legislative regulations

• non-allocation of funds by the authorities.

To mitigate the effects of these negative aspects, the organization will deal predominantly by the gradual development of the ability to assimilate the education of orphans/children n need by involving them into activities in order to arouse interest in school and sports.

Lack of funds allocated by the authorities might be compensated by making sponsorships from companies and in collaboration with other organizations of the same type.

The external environment has the following opportunities consisting in possible favorable situations such as:

• supporting the project by NGO

• identifying and attracting psychologists specialized in social integration of orphans/children in need

• attracting support civil society, including the media promoting social integration of orphans/children in need

• obtaining sponsorship from the private sector of economic activity.

In order to achieve a real analysis, we should not lose sight of the existence of possible

3.2. Threats or possible distress

In this category we include:

• involving only temporary partners and public authorities

• withdrawal of financial support from the private sector.

To overcome such situations, the organizations must make every effort and take all steps to ensure the longest possible involvement of the authorities and private sector partners in its work.

The organization should attract and involve the authorities, such as the National Authority for Child Protection in order to ensure children's rights, through the intervention of the law in administrative and judicial procedures on compliance and promoting children's rights. Other institutions with responsibility for child protection are local government authorities - county, city, town and village, making authorities such as the City Council , the Commission for Child Protection or the executive authorities and the General Directorate of Social Assistance and Child Protection Mayor or institutions of central government specialist - for example, the Ministry of Labor, Ministry of Education, Ministry of Public Health, Secretariat of the Government and their subordinate institutions.

An important role in improving the services offered to children in need in Romania have the NGOs. Since 1989, they have taken the initiative to resolve the situation of abandoned children in institutions, many international organizations providing funds for the development of alternative services. The NGOs are those who created, piloted and services transferred to local government authorities, expertise, professionalization of human resources programs, community involvement, etc. There have also helped to redefine the child protection system through structures established through pilot projects, which subsequently formed the basis for the establishment of Child Protection Departments. Since the establishment of the system, non-governmental organizations have improved methods of dialogue with central and local authorities, and implementation methodologies in partnership strategies in the field.

The long term achievements will consist in:

• determining the growth capacity of local government to assume the problems of children in terms of financial, human resources professionalization and development services according to identified specific needs

• increasing the efficiency and local partnerships between institutions or public-private type, including creating the necessary legal framework for contracting public social services for children.

• decreasing length of stay of children in the social protection system by creating the necessary legal framework for the integration of children separated from their families in a permanent stable environment as soon as possible after being taken out in the child protection system.

• decreasing the number of street children.

3.3. Legal framework

Convention on the Rights of the Child has brought significant changes since its ratification in 1990 [13]. Romania was among the first countries to ratify the United Nations Convention, in the year following its adoption by the General Assembly of the United Nations, by Law no. 18 of 28th of September 1990 [14].

Convention expresses more than any other document, the entire spectrum of human rights - civil, political, economic, social, cultural - and provides a complete development of the child's potential in an atmosphere of dignity and justice. All

rights expressed in the Convention are important and necessary, support each other without being possible to achieve a hierarchy. The Convention, children's rights are clear, concrete and accessible understanding and thereby satisfied the first condition in their compliance process.

COMMISSION RECOMMENDATION of the 20th of February 2013 - Investing in children: breaking the vicious circle of deprivation (2013/112 / EU)

EUROPEAN COMMISSION, Having regard to the Treaty on European Union, and in particular Article no. 292 thereof [15],

(1) Respect for human dignity is one of the core values of the European Union, which is reflected in the objectives of promoting a better quality of life for its citizens; Union must protect children's rights, to combat social exclusion and discrimination and promote social justice and protection.

(2) Children are at greater risk of poverty and social exclusion than the average population in most EU countries; children growing up in poverty or social exclusion are less likely than children from wealthy backgrounds to have better school performance, to enjoy good health and to realize later in life potential [16].

IV. Conclusion

To achieve the set of objectives, the organization will follow closely the rights of orphans/children in need, such as:

- the right to their identity, equal opportunities and respect for their ethnic, religious, cultural, social and linguistic diversity;
- the right to live with their brothers and sisters or maintain regular contact with them and other people important to them;
- right to a quality healthcare;
- the right of access to any type of educational and training activities under the same conditions as other children;
- the right to be prepared to become active and responsible citizens through play, sports, cultural activities and responsibilities increasingly larger;
- the right to participate in decisions affecting them and to be informed of their rights and regulations of state institutions where they live, in a manner appropriate to each age;
- the right to respect for their human dignity and physical integrity, in particular the right to conditions of human life, to education that excludes violence and protection against corporal punishment and all forms of abuse;
- right to a private life, including access to people they trust and competent bodies to provide them confidential advice on their rights.

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Relationship between self-regulated learning strategies with academic achievement: A meta-analysis

Kadivar. Parvin, Manzari Tavakoli.Vahid, Sarami.Gholamreza,

***Abstract*—** the research literature has paid a great deal of attention to the ability of students to self-regulate their learning. Considering the important role of self-regulatory strategies in learning, a meta-analysis was conducted to study the relationship between self-regulatory strategies and academic achievement. In order to conduct meta-analysis technique, the effect size of the relationship of academic achievement and self-regulatory strategies were identified. Among 31 studies, 16 of which were checked against pre-determined criteria for eligibility of relevance. This study was based on 4088 samples and 16 effect size. The effect size of the study was computed by Hunter & Schmdit's stages of meta-analysis. The results of the study revealed that the mean of effect size of the relationship between cognitive and meta-cognitive strategies with academic achievement based on Cohen's table (r=0.29). The effect size of cognitive strategies (r=0.41) were established. However the combination of the effect size of cognitive and meta-cognitive strategies (r=0.38) were computed. The effect size of relationship between motivational strategies of self-regulated learning (motivational beliefs, achievement motivation, achievement goals, goals orientation, and self-efficacy) and academic achievement (r=0.34) obtained.

***Keywords*—** self-regulation cognitive strategies, metacognitive strategies, motivational strategies, academic achievement, meta-analysis.

I. Introduction

The research attention in school setting focuses on self-regulation of human cognition and learning, which is frequently refers to as a self-regulated learning (SRL). Self-regulated learning is a complex process, containing cognitive, meta-cognitive, motivational, and contextual elements. Self-regulated students can control their performance before, during and after learning.

Self-regulation is a process in which students activate ,take control of and evaluate their learning .Self-regulated learners are aware of their strengths and weaknesses .Utilize metacognitive strategies ,attribute their success and failures to controllable factors

Pintrich (2000) described self-regulated learning as: an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate and control their cognition, motivation and behavior, guided and constrained by their goals and the contextual features in the environment (P. 453).

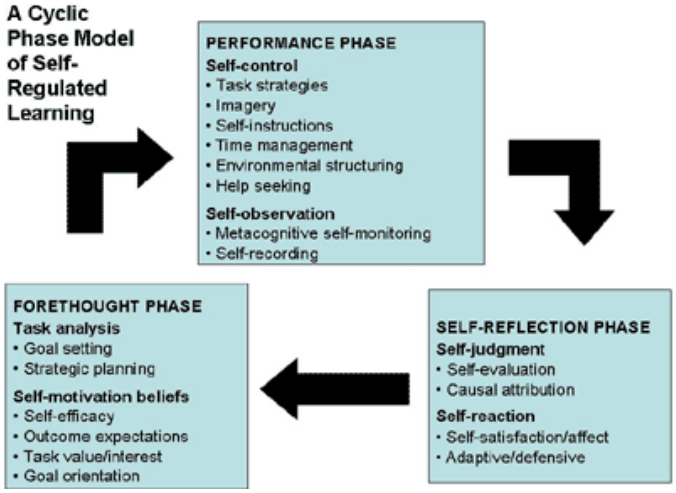
In social cognitive theory, Bandura (1997, 2001), related human regulation to three sub-processes: self-observation, self-judgment and self-reaction:

Self-observation refers to the deliberate monitoring of one's activities. Self-observation is very critical to the regulation of performance, which may lead to higher motivation.

Self-judgment refers to evaluating one's current performance levels compared to the goal level.

Self-reaction refers to one's behavioral cognitive and affective to the responses to self-judgments. Self-reactions can be motivating if one's believes lead to the idea of achieving progress toward their goals.

Zimerman (1998) expanded this model in three phase cyclical loop.



zimmerman (1998) model of self-regulation

Self-regulation is a cyclical process in which a learner will make alternation to strategies, cognition and behavior, during the process of self-evaluation and monitoring that will alter learning and ultimately the end-goal.

Forethought is a phase which self- regulation begins with it. This phase set up the learner for action toward their goal. In this phase the learner can establish a positive outlook, and set realistic expectation.

Performance (or volitional control) phase involves processes that occur during learning that affect action and attention. Applications of specific strategies are established

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during this stage to help a learner's success. Metacognitive strategies, preliminary self-evaluation and motivational strategies in this phase are identified.

Self-reflection is the final phase in which the learners reflect on their performance. The outcome of the reflection is critical in the learner action. If it is positive, the learner will continue to use the methods established to set and proceed toward future goals. Otherwise, learner will reevaluate and make necessary adjustments for future goals.

II. COGNITIVE STRATEGIES

The **rehearsal** strategies are employed by learners to remember materials using repletion. Some of rehearsal strategies include repeating the material aloud. Copping the material, taking selective notes and understanding the most important part of the material.

Elaboration is the process by which the learner builds an internal connection between what is being learned and previous knowledge. Specific strategies include, paraphrasing, summarizing, and creating analogies, generative note-taking and question answering.

Organization makes the information processing deeper. In this process the learner makes connections with the information received in the learning environment. Specifically, the learner may select the main ideas through outlining, networking and diagramming the information

III. META-COGNITIVE STRATEGIES

The theoretical framework of self-regulation is based on the ways people organize their meta-cognition. The meta-cognitive strategies may provide students with the most promising tools to enhance their academic achievement. Meta-cognitive strategies include planning, monitoring, and self-regulation.

Planning strategies such as skimming the materials, monitoring self-regulated strategies such as self-testing and test-taking, attention focus have been utilized by high achieving students (Zimmerman & Martinez Pons, 1986).

In the process of monitoring the learners check themselves for comprehension of knowledge or skills. Regulating strategies involve processes such as adjusting reading rate, re-reading, and reviewing.

IV. MOTIVATIONAL STRATEGIES

Three categories of motivation are distinguished regarding motivation:

Self-efficacy refers to the belief of a learner in his or her ability to accomplish a task successfully. It includes judgment about one's ability to accomplish a task and one's confidence in one's skill to perform the task.

Task value refers to the belief in the relevance and importance of a task.

Goal orientation refers to the learner's reason to engage in a task. Either he or she is intrinsically or extrinsically motivated to be participating in a task.

V. METHODOLOGY

A meta-analysis was conducted to accumulate an overall correlation coefficient(r) from a set of independent correlational studies. Two methods of meta-analysis are used:

Hedages and olkin, 1985), and Hunter Schmidt's method which is effectively a weighted mean of the raw correlation coefficient (Schmidt and Hunter, 1990).

In the present study, correlational results across independent studies, between 2005_2013 that address a related set of questions, were accumulated. The literature base was thoroughly searched for correlational studies relevant to the question of the study" what is the relationship between self-regulated learning and academic achievement" were selected. 31 studies which were on the relationship between academic achievement and self-regulated learning were selected and checked against pre-determined criteria for eligibility of relevance. As a result 16 of the studies were selected and become the data base for the subsequent analysis.

Results and discussion

Meta-analysis is a statistical technique by which the quantitative results of multiple studies focusing on particular question are combined.

The unit of analysis in the present study was not the individual participant, but the effect size found based on the primary studies. Effect size can be estimated based on Cohen's (1999), the effect size .01, .03, .05 respectively small, moderate(average) and large.

Effect size of cognitive, metacognitive, and …

Strategies	Predictive	Criterion	N	Mean of effect size	SD of effect Size	Error of effect
Cognitive	Self - regulated learning	academic performance	10	0.41	0.23	.07
Meta cognitive	Self - regulated learning	academic performance	6	0.29	0.17	.04
Motivation	Self - regulated learning	academic performance	8	0.34	0.21	.53
cognitive and meta cognitive	Self - regulated learning	academic performance	16	0.38	0.18	.03

The effect size of cognitive strategies based on Cohen's table was above average (r=0.41). The effect size of the metacognitive strategies was(r=0.29) which is around average based on Cohen's table. However, the combination of the effect size of cognitive and meta-cognitive strategies based on

the Cohen's table was above average(r=0.38) the effect size of motivational strategies was also above average(r=0.34).

The relationship between self-regulated learning with academic achievement is highly important for learning and instruction .For this reason, education should help students to be aware of their thinking ,to be strategic in their thinking, motivation toward valuable goals.

Zimmerman(1998), showed the importance of skilled self-regulated students and naïve self-regulated students as follow:

Self-Regulatory Sub Processes of Naive and Skill Full learners

Classes of Self-regulated learners
Naive and Skill Full

Self- regulatory Phases of Naive self- regulators		**Skill full Self-regulators**
Forethought	Nonspecific distal goals Performance goal orientation Low of self- efficacy Disinterested	Specific hierarchical goals Learning goal orientation High self-efficacy Intrinsically interested
Performance Volitional Control	Unfold Plan Self – handicapping strategies Outcome self-monitoring	Focused on Performance Self- instruction/ imagery Process self-monitoring
Self-reflection	Avoid self-evaluation Ability Attributions Negative self-reactions Non adaptive	Seek self-evaluation Strategy/ Practice attributions Positive self-reactions Adaptive

Since we need self-regulatory strategies throughout entire life proper self-regulation habits can lead to a work ethic –a belief in the value of hard work. That affects continued motivation in task beyond school.

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Architectural Education in the Light of Climate Change – Case Study: Agrarian Landscape as a Resource for a New Sustainable Lifestyle

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***Abstract*—**This article represents Master students' research on situating a housing complex in the context of the agrarian landscape of Vojvodina, Serbia, considering it as a resource for a new urban lifestyle. Students have had a task to explore potentials of shrinking the city of Belgrade throughout the agrarian landscape, as to affirm the role of place and its culture in contemporary everyday life. They were expected to explore the possibilities and limitations of networking nature and architecture, how various architectural approaches harmonize with natural environment and balance the impact of built environment onto the landscape. This article shows that sustainable architecture means reaching a higher quality of life and designing through adaptive involvement and in accordance with nature.

***Keywords*—**agrarian landscape, place-based pedagogy, architectural education, climate change, housing, Vojvodina region

I. Introduction

Over the past few decades, the theme of protecting and adapting natural landscape in shrinking cities shifted from theoretical to practical discourse focusing on the effects of climate change. City edges are in a sensitive phase of development, where economic parameters have widened to the fields of ecology and culture, significantly changing the balance between demands and values of the place. Our social conscience has become aware of how human actions are progressively devastating natural environment [1]. The most dramatic change is related to the relationship between built and natural landscape and is most obvious in shrinking cities. In these circumstances, seeking for new architectural paradigms when designing in disappearing agrarian landscape represents a particular challenge.

Series of extreme weather events in Europe and worldwide has shed light on the vulnerability of natural environment. The urgency of the problem caused by environmental change posed a number of new architectural challenges. In addition it must be kept in mind that the issue of climate change is essentially a super wicked problem, as the achievement of sustainability cannot be approached from one angle and through one scientific or professional discipline, but rather it is necessary to engage oneself in a holistic way. This situation shows that environmental problems demand consideration of all professions involved in the production of space, which includes architecture too [2].

Therefore, in architectural schools all around the world the issue of climate change has been set as an essential goal in faculty teaching. Regardless of the all-encompassing agenda of this project, the implementation of these ideas in architectural education is coming about in a different way than expected. The main problem lies in the inefficiency of faculty curriculum to methodically implement the proclaimed objectives.

One of the seductions of modern architectural education is that it can be understood as context-free activity. The knowledge students acquire in architectural schools is generally unrelated to their place – it is universal expertise of no-place. In recent years many publications have argued the need to replace traditional patterns of architectural education with the more flexible models. Some authors argue that architecture cannot and should not be taught in the abstract only, but knowledge and skills must be shaped though students' involvement in real problems and with places [3].

The "place based" pedagogy is a response against a conventional education that keeps students in classes and thinking about reality in the abstract sense. It is manifested in the research on how learning and school communities are conditioned by the natural environment. Gruenewald thinks that this idea is radical because current educational discourses seek to standardize the experience of students from diverse geographical and natural backgrounds [4], [5]. Sobel thinks about "place-based" education as a paradigm: more as a mindset then as a specific kind of curriculum. According to this autor, "place-based" education is *„the process of using the local environment as a starting point to teach concepts*" [6]. "Place-based" education is not just motivated by a desire to overcome the divide between conceptual knowledge and lived experience – it seeks to address some of the varied ways in

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which we are connected to our places.

As a reaction to these pre-conditions, the goal of this paper was not to describe how architectural education can respond to the issues of climate change impacts on agrarian landscape in general terms, but to examine the relationship between men and nature, climate change and particular landscape via architecture in the context of agrarian landscape and irrigation channel network in Vojvodina, where place-based pedagogy represents effective teaching strategy for exploring the issues of climate change impacts on soon to be transformed agrarian landscape and its protection and adaptation strategies [7].

II. The Approach Toward Architectural Design

Mark Wigley considers that environmentally responsible design is one of the ways of thinking about architecture [8]. According to this argument, the new concept of "true architecture" is no longer based on the architecture that is spectacular and insensitive to the surrounding, but is directed towards architecture that lives in harmony and protect the environment. When talking about understanding of the city, Lopez sees it as a dialogue between man and nature, where natural circumstances can and should be registered through interpretation and evaluation experience and perception that residents are achieving through daily use of architectural space [1] Therefore, architectural design that ignores local context and community, risks to produce environmental problems rather than to solve them [2]. In this sense, the term "sustainable" in architectural design is used with the motif of longevity and lasting benefits when applying a specific model or approach into space. Therefore, sustainable architectural design is one of a holistic approach towards landscape using it as a starting point in creation.

The focus of this kind of architectural intention is not to incorporate landscape as a part of architectural creation, but to observe and translate landscape as an appropriate tool for thinking about architecture. The main principle behind this kind of approach is that architecture can be guided by people's experience of landscape. We can be guided by observing places that are dominantly formed and evidently caused and variable in relation to natural forces, such as sun, wind, rain and seasonal cycles; but also by vegetation and shapes that are the consequences of geological changes that were created by the changes during the long period. We can learn from landscape lessons about interconnectedness, growth, decay and stability, about continuous adaptability to climate change and of course about the subtle strength [9].

In short, the role of the architect is to incorporate this dialogue into the project by listening-understanding-responding to the "voices of the natural and cultural context" and interlock it with the experience of the users of the real place. Architects should incorporate the natural in a fundamental manner into their project in order to affect mind and body as a way to improve and intensify our relationship with nature, through architecture - an experience that might increase society's awareness and responsibility of the urgency to preserve and respect nature [10].

One of the ways in which architecture can engage itself in the process of sustainable development is in finding new ways of negotiating between the values of natural landscape and everyday life, through housing. As a form of artificial structure, it can provide infrastructure able to engage the local community and involve the general public through an experience that might also increase society's awareness of the urgency to preserve and respect nature [11].

III. Case Study: Agrarian Landscape in Kovilovo, the Region of Vojvodina, Serbia; A Resource for a New Sustainable Lifestyle

This article represents Master students' research on situating a housing complex in the context of the agrarian landscape of Vojvodina, considering it as a resource for a new urban lifestyle. Students have had a task to explore potentials of shrinking the city of Belgrade throughout the agrarian landscape, as to affirm the role of place and its culture in contemporary everyday life.

The Process: Learning from the Landscape

Students have had the task to examine the position of new housing typologies in the context of the agrarian landscape and irrigation channel network of Vojvodina. The aim of this design studio was to explore how various architectural program/spatial models harmonized with the environment can contribute to the use of management strategies in minimizing negative impact of built structures on the landscape. Students were expected to find new possibilities and limitations of networking nature and architecture by researching the impact and prospect that various housing models have on degradation of the agrarian landscape.

During the semester, students were expected to thoroughly learn and accept a wide range of options that promote the idea of sustainability, including environmentally responsible design, protection and enhancement of natural resources. As to enhance different forms of research the overall theme entitled Learning from the Landscape was chosen. The intention was to examine the significance and position of the landscape in the process of architectural design in the light of climate change. Therefore, the task consisted of three steps:

_*The first step* was the examination of the agricultural landscape with the aim to provide different requirements for the new program framework of modern living, on one side, and the definition of a theoretical framework through the concept of place-based pedagogy and climate change. This phase was long and exhausting as students had a task to read various articles on the relation between men and nature and at the same time to explore phenomenological side of the particular context, in all its character and through its structure looking for specificities that make it a unique place. These two fields were then, for the purpose of making a final architectural approach, examined simultaneously as to emphasize critical notions towards a particular context and provide viable

resources for setting the future individual design concepts.

_*The second step* was the formation of spatial and program basis for re-defining the role and character of the residential function in harmony with the agrarian landscape. This step was a kind of negotiation process between nature and architecture, where the main concerns were a misbalance between preserving agrarian landscape and protecting its changing naturalness, questioning the role of housing typology and the fact that nature and architecture represent distinct phenomena in permanent collision.

After this step, we have discussed the relationship between architecture and the interpretative potential of the sensual experience we have from the landscape and concluded that instead of creating mere objects of visual seduction, architecture relates, mediates and projects meanings [12]. Anselm helped us in understanding achieving nature's integral design lies in understanding the natural environment (topography, terrain, management of climate and energy) and entailing Ecosystem by its interactions with building design [13]. We agreed that designing with nature begins with an intimate understanding of place, careful management of local climate condition and incorporating its characteristics (winds, orientation, sun reflections) into architecture.

_*The third step* was the spatial interpretation of the previous two steps through the preliminary architectural project. Students were looking for an appropriate shape, intensity and modality of architectural interventions in the limits of the physical, program and thematic framework and also were looking for new models of binding nature of the city which resulted in changing the identity of the urban landscape, and the alignment of the new intervention with the values and potentials of the city.

The intention was that students' research examine the importance and role of the landscape in the process of architectural design, and later through the analysis of complex problems related to urban lifestyle as well as to the natural landscape invent housing models which should translate their analogies in imaginative architectural interventions, extreme in its relation of the body and man to the context.

IV. The Place: Agrarian Landscape on the Outskirts of Belgrade

Before reporting results of student's research we have to say a few words about this particular landscape, on the outskirts of Belgrade in the region of Vojvodina, as well as reasons to choose this particular landscape as our case study.

This region of Vojvodina is a vast agrarian landscape, wide open and almost perfectly horizontal. Therefore climate is the most notable item in it. It has a network of beautiful irrigation channels, with strong agricultural tradition pointed with small settlements in accordion with the fact that the highest wind tides in Serbia are here. This particular place is in no way different than any other agrarian landscape in this region but for two things. The first is that it is a perfect viewpoint for the skyline of Belgrade, and the second far more important and less romantic is that the highway bridge across the river Danube is about to be inserted in the middle of it, forming a second circle around the city of Belgrade and bringing closer places that never in its history have been connected before. It will soon become an intersection of the inner city driveway Belgrade-Zrenjanin and a mentioned ring highway. This particular challenge made us believe that this is a right choice as to rethink shrinking possibilities planned for a new housing development in accordion with agrarian landscape.

Fig. 1 Arial view of three macro-urban parts of Belgrade (City Centre, New Belgrade and Third Belgrade), source: Bing Maps

Looking at the wide perspective, the reason to choose this place was two-folded. First the insufficient awareness of the values natural resources have for the contemporary everyday life, and the fact that in circumstances where landscape and man have to intertwine architectural intervention requires acts of translation, challenging a new creative perspective in creating a new cultural landscape.

V. Student's Work: New Housing Opportunities, New Lifestyles

At the conceptual level, student's designs differ in terms of program and space. Dominating over the nature at one moment and leaving the natural surroundings to live its own life in changing natural conditions in another, architectural solutions embraced the irrigation channel, the fact that wind should be a part of architectural creation, that mud and land in itself offer a new perspective for a better lifestyle, all in respect to providing a unique landscape adaptable to future life.

Three distinct relations towards the landscape are to be distinguished. The first approach was named the Interlocking Model. It stresses the importance of intertwining landscape and urban lifestyle, mainly through the content nature can offer as a viable resource. The second was named The Focal Model. It emphasizes the distinctiveness of nature on one side and built structures on the other, leaving for both enough space to develop and change in their own rhythm and pace. The third was named The Dispersed Model. It accentuates the landscape as a resource for the housing.

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Interlocking Model

Linear spatial approach insists on layering and overlapping of natural and housing environment. The structure follows the coastline through linear sequence of spatial contents and forms, having the quality of the event. Intervention embraces the channel and soil with all its fluxes with the ability to live in the accordance with nature, stressing the importance of being in the balance with nature.

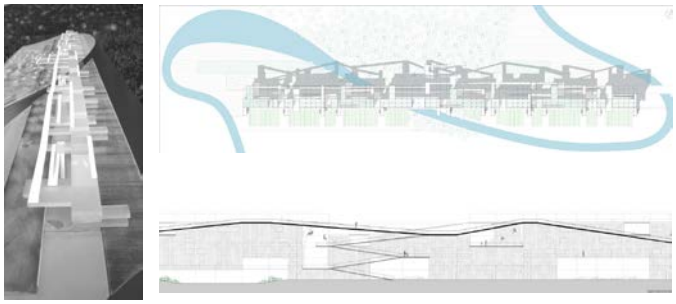

Fig. 2 Interlocking Model, project*:* Playing Landscape

_linear sequences of spatial contents and forms, overlapping and intertwining;

_emphases is on the sequence and change of domicile ambient, providing diverse logics of space from individual and intimate to public and wide open;

_playing with landscape would be an appropriate way to explain spatial and content articulation of activities provided through housing;

_makes a man to be a part of the living landscape, a witness of it cyclic rhythm and character;

_dynamic relation between housing units and the uniqueness of the landscape, particularly the agriculture, the channel and the forest.

Focal Model

Focal spatial approach is based on the notion that intervention must be unique in its character, visibly and structurally. Protecting natural landscape and minimizing its transformation means keeping it as much intact as possible. Underground or as a superstructure it creates a sensation of revitalizing previous, valuing agricultural as a heritage in a new powerful way. In linking nature and architecture through their concept, content, structure, meaning and identity artifacts fight for supremacy. Opposed attitudes shape the form of sub-urban city lifestyle through their mutual denial, supporting or complementary juxtaposing.

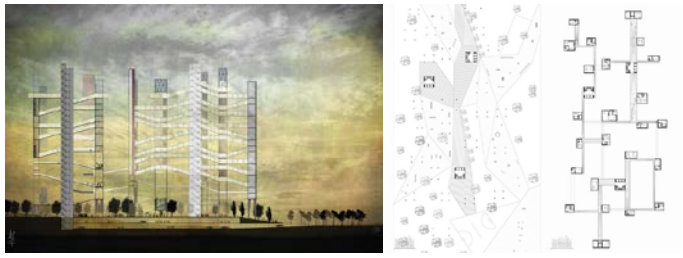

Fig. 4 Focal Model project*:* Urban Forest,

_intervention has to be unique in its character, plausibly high density and high rise structure with a particular identity which mimics the character of the landscape;

_protecting natural landscape and minimizing its transformation means keeping it as much intact as possible;

_emphases is on the distinctiveness of both structures and on the link between which is not perceptible from far away, but only on the level of the man;

_dreaming landscape would be an appropriate way to explain its ambient articulation and above all a liberal uniqueness in character;

_looking through the lens of landscape, looking above or even looking for the landscape explores the relation between the two on the mental level.

Dispersed Model

Dispersed spatial concept shows that it is possible to use nature as a structural element of creation and that building in accordance with nature means above all shaping it in human scale and through human interaction. The focus of these interventions is to position the natural resource (land and water) as the main organizing element of the living structure. Instead of building housing, it proposes building cultural landscape which will inevitable affirm the environment and inhabit it subsequently. With just a few newly-placed architectural elements organized in the net of events in accordance with the eco system and upcoming climate change, the principle of vitality and viability in the transformation of nature could be achieved.

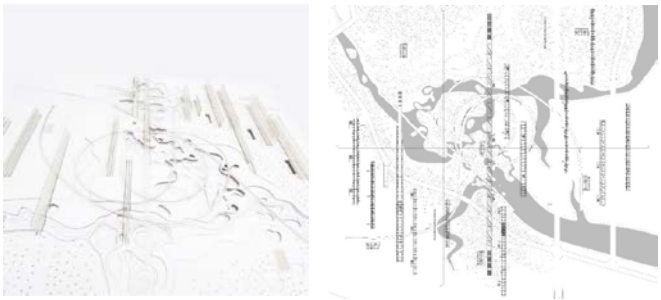

Fig. 4 Dispersed Model, project*:* Sownscape,

_landscape is a mentor

_instead of structuring the housing, open-space is structured as a net of events in which housing play an possibility role (when and where is not given but only infrastructural provided

_emphases is on reconciliation of the relationship between river and land, or wind and land

_living landscape would be an appropriate way to explain spatial and content articulation of activities

_makes a man to be a part of the living system

All solutions encourage awareness and learning about ways to preserve and encourage a high degree of urbanity through rethinking the structure of landscape, the development of its

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vitality, attractiveness and accessibility, and also through the respect for the inherited values of the place.

VI. Discussion

None of the designs should be considered only for the picture it represents, but for the spectrum of various events it offers, which bears relation to the inherited structure, degree of animation of natural scenery, and the importance of establishing dialogue between the need for protecting the landscape. Exploring the relationship between nature and architecture and emphasizing their dichotomy we concluded that the ultimate meaning of any building is beyond architecture. Architecture is seen as a supplement of the nature by which our abiding in it is enabled. It is a reconciling element that enables human survival in nature.

By accepting the way in which argues sustainable and good design as being simultaneously logical (scientific, technical, functional), ethical (security, low impact, protection, good use) and aesthetic (beauty, meaning, emotion) we concluded that sustainability could become a means of achieving a better quality of life, not a goal in itself [1]. Bearing this approach in mind, we concluded, as Van Hol suggests, that being smart means thinking ahead, building an environment that adapts cleverly and works interdisciplinary, stressing out the quality of it, not mare ecology [14].

Designing cultural landscape begins from the landscape as a major instrument of creation, as landscape urbanism proposes, where architect understands its diverse conditions, but also has to take into account the potential of built structures, as well as our own needs and aspirations, as to be able to find answers to how and by what means it is possible to comply with it [15], [12].

Agrarian landscape could become a valuable resource for contemporary edge-city living. High density housing typology can offer protection for the agrarian site in harmony with its natural surroundings. Transformed and naturalized architecture summarize elements and processes that can provide a balance between man, city and everyday life, on one side, and preferences of natural landscape as water, soil and other natural resources, on the other. As architecture has the ability to communicate with the environment, we concludes that sustainable architectural design means reaching a higher quality of life and active involvement of people and their everyday life through agrarian landscapes in which changes in their relations are dynamic and therefore adaptive and transparent.

We think that it is possible to balance landscape and architecture through responsibility, as a way of thinking as a part of the architectural concept. Through incorporating the new architectural paradigms as an integral approach toward vital and smart architecture it is possible to form a socially responsible place. New paradigms include sustainability as a resource, where nature together with architecture makes a unique place-based system in which it is not the context or background, but its structural component. Its cyclic nature makes space flexible and adaptable while architecture gives a platform for including man into its everyday life; the life of nature. Those results showed that the design in the natural environment, with the right approach, guided by the synergy between nature and architecture brings a new and better architecture, which also emphasizes the quality of that from which it drew inspiration from and was created for – a living landscape.

VII. Conclusion

When curriculum mimics education in the surrounding environment, the boundaries between schooling and life become more obscure; and therefore, more integrated. This type of research contributes not only to solving of problems concerning the landscape of Vojvodina and contemporary architectural intervention, but it also participates in raising appropriate general awareness on the subject of adaptive quality of places seen in the prospect of global climate change. As architecture has ability to communicate with the environment, the article concludes that sustainable architectural design means reaching a higher quality of life and active involvement of people and their everyday life through agrarian landscape in which changes in their relations are adaptive and transparent.

Results of this study reveal that place-based pedagogy has elements that enable teaching of context-specific knowledge, skills and abilities that are essential for facing with the issues of climate changes impacts on landscape. The research pointed the necessity for introducing the concept of place-based pedagogy and issue of climate change at the lower levels of faculty education, and that it is necessary to implement goals of this teaching approach into all aspect of the architectural curriculum.

Universities in Serbia are slowly becoming polygons for the implementation of curricula in harmony with sustainable development, and in line with climate change. Following the imperative of sustainability, Faculty of Architecture in Belgrade encourages research on the complexity of relationship between society, technology and the environment by means of rethinking architectural models. This is a new way of thinking, which is reflected in the re-design of what we mean by nature and man's place in it. As housing is constantly seeking new havens, agrarian landscape can become a resource of modern life in the city.

Anyone who teaches architecture knows that educating students to become architects involves more than just inculcating the knowledge, skills and abilities reified in the school curricula. The responsibility of architecture, as professional and pedagogical practice is to create conditions for greater integration between built environment and natural landscape. In the end, this paper suggests that it is necessary to initiate future professional study of the potentials and possibilities for the protection of similar sites, as a basis for preventing further degradation of protected landscape in the time of climate change.

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Dragan Markovic, born in Palanka and lives in Belgrade, Serbia. He graduated from the Faculty of Architecture – University of Belgrade in 2011 and is currently a PhD student at same faculty. Since then, he prepares his PhD theses exploring contemporary approaches in architectural education. He publishes professional and research papers in national and international conference proceedings, monographs and journals. Dragan is a co-founder of the super_space web-platform (www.superprostor.rs) and is actively involved in architectural and urban design competitions for which he gained several prices.

Training and Work Skills

Maria José Sousa
Portugal

Abstract: In this article we will analyze the concept of skills on the sphere of training and work. The relevance of this research is based on the approach to theories of skills development.
The research problem considered the analytical dimension of skills development in organizations anchored to the following research question: What are the skills associated to work and training within an organization?
Based on the literature review of prospective studies conducted in industrial activities sectors developed in the last 15 years, were investigated and identified the skills needed to develop organizations. The main goal of this study is centered on the research of more relevant skills which can contribute to organizations performance. The methodology used is document analysis, based on the prospective sectorial studies on industry.

***Keywords*:** *skills, training, work, organizational characteristic, individual characteristic, knowledge expertise.*

1 Introduction

The main objective of this research was to identify skills for organizations development and performance.
The identification and development of skills are challenging tasks, either internally within organizations, either externally, by the creation of public policies on a complex economic environment. In the context of this article the focus will be in the identification of sets of skills associated to training and work.
The article briefly explores the concept of skills, followed by the presentation of the methodology that was used as the basis for the skills identification and concludes with the research findings.

2 Concept of skills

In the 80s the concept of skills starts to have a big importance due to technological, organizational, and economic factors. It begins to be considered as a resource – of individual and organizational nature – which would allow competitiveness and productivity advantages to companies.

The complexity and the uncertainty, partly due to the globalization and accelerated rhythm of technological change, demand human resources with skills that help the organizations to overcome the appearing challenges.

In this context, [1] define skills as a "set of knowledge, capacities of action and behaviors, structured according to an objective in a specific situation".

Meanwhile, as a result of the changes occurred in organizational contexts, other concepts emerged associated with the concept of skills. In this way the concept is created of organizational skills which are considered by [2] as a co-ordination of different basis of knowledge (know-how, know-what and know-why) and its application to one (or more) product(s) or process(es).

In the same way the concept of individual skills has been studied by different authors, for example [3], who build a typology of skills based on the typology of [4]. This typology distinguishes the following types of knowledge and capacities in skills:

- *theoretical knowledge*: which integrate the concepts, the subject knowledge, the organizational and rational knowledge and also the technical knowledge about the context and processes, operational methods and means;
- *know-how*, related to the ability to execute operations and use instruments and apply methods and procedures. These know-how have an operational character, of practical application or operationalization of theoretical knowledge;
- *social and relational know-how*, related to attitudes and personal qualities [4] and to the predisposition to act and interact with others, i.e., the ability to co-operate with others;
- *cognitive capacities*, which are related to intellectual operations, that can be simpler (enumerate, compare, define, describe) or more complex (inductive generalization, constructive generalization, analogical reasoning, abstract reasoning). They describe capacities of combining different knowledge, of co-ordinating actions so that solutions are found and problems are solved.

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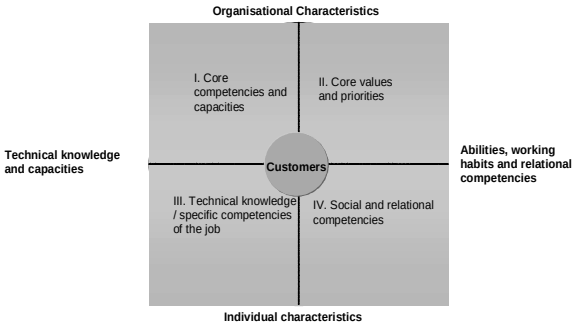
Historically, the word *skills* have been used to refer individual characteristics. However, in the concept of [5], although the skills always refer to the individual, all of them have two dimensions, the individual and the collective (organizational).

In this way, the concept of skills assumes a rather large scope which makes it complex and makes its comprehension /understanding and concept delimitation difficult.

Green [6] tries to contribute to the clarification of the concept of skills by presenting some different senses it can assume.

Fig. 1 – Skills Scope



Source: Green (1999)

2.1 Organizational Characteristics

The organizational characteristics reflect the identity of the organization in which the mission, the values and its own culture are inserted. This holds the core skills and capacities that are reflected in the mission and in the vision of the organization, beyond the values and core priorities that are reflected on the shared working habits and in the handbooks of conduct and ethics.

The *core skills* are the strategic skills, which make an organization unique and distinctive. They can be, for instance, a technical knowledge or a specific technology which can offer a unique value to the customers and that distinguishes the enterprise from the rivals. They are the basis for the organization to develop beyond its final products.

A core competence is the technical know-how, which is of the outmost importance for the objectives of the organization. They are a source of competitive advantage which is the result of the value acknowledged by the customers and it is difficult to imitate.

The core capacities are also very important for the effectiveness of the organization and are easily understood by the customers – "they are a set of business processes strategically understood". [7]

The *values and priorities* of the organization aim to create a sense of community, which can lead to an increase of trust and commitment by the workers.

They complement the technical aspects of the work and explain the reason why the work is accomplished. They imply the sharing of beliefs and cultures, including behavioral rules.

The priorities reflect the effort of the organization to use individual skills, such as working habits, people's knowledge to fulfill the business and to make the working systems function, in a more efficient and effective way.

An important priority of the enterprise is its will to promote the participation of the workers, in order to develop its performance [8].

2.2 Individual Characteristics

The individual characteristics change the performance of the individual because they reflect themselves in the content of his/her work.

In what regards the individual characteristics we may identify *the technical knowledge / specific skills of the job* and *the social relational skills*:

2.2.1 Technical knowledge / Specific Skills of the Job

These types of knowledge are learnt in formal learning situations and differ according to the specificity of the job and the sectors of activity. They are the basis of the core of strategic skills of organizations.

2.2.2 Relational and Social Skills

These skills include working habits, communication styles, leadership forms and teamwork. They are skills easily transmissible between jobs and even sectors of activity. However, they vary from organization to organization, according to the importance that each one gives to certain skills or to leadership/management styles adopted.

The social and relational (or behavioral) skills are used / developed in the execution of job related tasks, but are also the support to the core values and priorities of the organization.

Both the individual and the organizational characteristics can have a strategic aspect and contribute to the creation of value, generating advantages acknowledged by the customer: fastness of response, precise demands of quality, after-sales service– we are therefore speaking about strategic skills.

In the same line of thinking, [4] speaks of critical skills, considering three criteria: strategy, competitiveness and specificity or rarity.

- the criterion strategy takes into account the indispensable skills to the strategic orientations of the organizations;
- the criterion competitiveness allows to identify the necessary skills to acquire or keep a competitive advantage in a domain of activity;
- the criterion specificity has to do with the specific characteristics of the enterprise and that are not found in the working market.

Despite the duality that skills assume, in last analysis they are a set of individual and / or group knowledge that allow to generate orientation to ensure sustainability and competitiveness of the organizations.

2.3 Contexts influencing skills development

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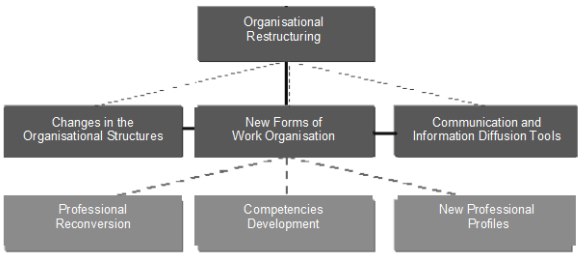
In the last years, the organizations have faced an increasing competition, budgetary constraints and a major technological change. To face these changes many have developed practices, policies and processes that have an increased value to the customers, reflected for instance in the improvement of service quality, reduction of the costs or a bigger fastness in the product delivery/service accomplishment.

Influenced by these changes, the organizations have been suffering structural changes implying the need to develop new skills. The following picture presents a scheme that intends to show the relationship between the Organizational change and the rising /development of new skills.

Fig. 2 – Relation Organizational Restructuring /Skills Development



Different empirical studies have revealed that the Organizational instruments lead to changes in the structures of organizations. It can be observed that work organization, mainly structured by multiple functional levels, has tended to change into a horizontal model, where all the workers play a key-role in what concerns the taking of decision and the organization of his / her own work.

The same studies confirm that there is an orientation for the creation of work groups/teams, instead of individual work, emerging a need of work co-ordination instead of a culture of control and centralisation of decisions. These changes imply that the elements of the teams need to possess skills, the necessary information autonomy to respond to unpredictable disturbances, resulting from of the technical systems and of the environment.

On the other hand, the work begins to be organised in turn of the processes and not of the jobs, implying not only team work but also, and most importantly, the responsibility taking by each of the workers for the quality of the developed work and for the achieved goals. These developments require skills at the level of technical knowledge and especially at the level of relational / social knowledge.

Already in 1993, Kóvacs approaches the anthropocentric model which "assumes the development of specific structures conceived according to the valuableness of the human factor and new Organizational principles such as the autonomy, responsibility, creativity, professionalization, decentralisation, participation and co-operation, being demanded new technical and social knowledge for each level of qualification:

- superior management staff: they must have a systemic vision, a strategic management, new methods and techniques of management and capacity of sharing information, listening, negotiating and motivating;
- superior technical staff connected with new technologies: they must have knowledge of "*hardware*" and/or "*software*", as well as "*orgware*", co-operation with specialists connected with the social system so that the integration of the TI in the organizations is possible;
- medium leadership: more planning, greater co-ordination and less direct control are required. Beyond larger technological knowledge they must have motivation for the formation, communication and co-operation, which presumes higher technical formation in the areas of organization, management and human relationships;
- operators: they should be polyvalent, have initiative and responsibility spirit, capacity of identifying and solving problems, know how to communicate and work in team, having also to achieve quality control.

So an organizational paradigm which appeals to organic flexible structures, continuously adaptable to new situations is presented, in opposition to bureaucratic and centralised structures. In this paradigm the enterprises tend to be innovating and more receptive to changes. They implement new forms of organising work and present decentralised and participative models of decision, appealing to a greater autonomy and responsibility by their collaborators. However, to achieve an organizational development to this level, an investment must occur in the development the skills of people from the organization.

All these types of skills have in common a focus on performing work activities and can be used by organizations to help systematize their own skills, contributing to the creation of a tool for fundamental work that could provide answers to the challenges posed by economic and social context in which they operate.

3 Methodology

The methodological approach of the research was qualitative or intensive. With regard to the specifics of this research the main technique used was content analysis from the literature review of prospective studies on organizational innovation skills. This methodology was used to analyze the presence of certain words or concepts within the studies to identify skills which can boost innovation in organizations.

This is an exploratory and descriptive study comprising the data collection, analysis and synthesis of results arising from research in Portuguese prospective studies developed in industrial sectors using a systematic analysis.

The search was based on the keywords "skills" and "innovation", and the period considered was between 1999 and 2014.

4 Research Findings

4.1 The Sphere of Work Skills

4.1.1 Management

- skills at the level of the definition of business strategies which add value to the offer starting from immaterial factors;
- skills at the level of the definition of internationalization strategies (to identify and analyze potential markets, to select and implement ways of entrance in the markets, to define product types to internationalize);
- capacity to manage strategic deals and alliances with enterprises of the sector (for instance, to give response to more demanding orders) or of other activity sectors (for instance, to present solutions);
- capacity to diversify the business area, identifying new business opportunities, investment analysis, economic viability studies;
- social and relational skills, in what concerns the capacity of communication, leadership and interpersonal relationships;
- skills related to the management of people and their development

4.1.2 Workplace Innovation

- social and relational skills, due to new forms of work organization;
- skills associated to the greater necessity of polyvalence of the professionals of the production area, so that they can operate different types of machines;
- skills associated with new forms of work organization, in what regards the methods of teamwork, flexibility to adapt to changes in the working processes (as a response to the high rhythm of innovation), knowledge about different types of technologies (of different generations and with different uses,…) such as it is the case of the progressive tendency for the use of flexible working cells and of teamwork;
- skills regarding a bigger initiative, decision taking and responsibility assuming;
- skills regarding the quality control and specially regarding the patterns of quality and technical specificity of products;
- skills associated with the hygiene procedures and security at work in general, and in particular regarding the use of individual protection equipment;
- skills associated with the redrawing of productive layouts, through the contribution of the various enterprise areas and of the suppliers themselves, to create more adequate work flows within the different areas of the production process, in a way that it allows the rational circulation of materials, reducing the non-productive times and consequently the costs associated to the production;
- skills associated with the organization of the working conditions, having in mind the rationalisation of the investments in equipment and guaranteeing the observance of the aspects related to the hygiene system and security at work;
- skills associated with the analysis of information related to productivity, in what concerns manpower costs, production costs, quality problems in the process and in the product, stock management (raw material, materials or finished products) among others;
- skills related to the possibility of implementing new models of work organization, recurring to models like the JIT, the TQM or the CIM, taking into account line the costs of production and deviation of productivity;
- the adaptation to change (raw materials, materials, technology, products);
- the development, continuity and support to more flexible forms of work organization (working posts rotation, group work);
- the organization and division of work according to the characteristics of the work organization and of the individuals;
- the capacity of developing social and relational knowledge which allows the co-ordination of working teams, taking advantage of all the potential of its elements;
- skills associated with the knowledge of the subcontracting market, which allow to select enterprises and subcontracting them according to production capacities (quantity, quality, deadlines and production costs);
- skills related to the quality rules applicable to the sector and to the specificity of the quality system implemented in the enterprise;
- skills related to the area of Security at Work, in what concerns the implementation and the use of individual security mechanisms.

4.2 The Sphere of Training Skills

The analysis of the skills of the sphere of training will be made from an organizational standpoint. In this context, it is go-seek to identify skills in training that aim to contribute to the skills development of the sphere of work.
Thus, the analysis will be done according to the roles that different organizational actors perform.

4.2.1 Managers and technical training

- Identification of training needs (organizational diagnosis)
- Design of the Training Plan
- Conception and design training to the needs of the organization
- Design and management of an information system, monitoring and evaluation of training

4.2.2 Managers of the business areas

- Tutoring, Mentoring and Coaching
- Accountability of employees

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– Ability to give and receive feedback

4.2.3 Employees
– Ability to learn in different environments / systems
– Ability self-training
– Motivation for participation in multidisciplinary working groups

For its part the organization can create systems and mechanisms that foster these skills:
– Communities of Practice
– Forums
– Knowledge Portals
– Digital Libraries
– Another type of corporate training

5 Future Research

New expectations of innovation skills are emerging as this research field is becoming strategically important for organizations. In this context, a consistent framework needs to be developed.

Directly related to the findings from this research, other aspects could be developed in the future:
– Develop a theoretical model of reference that summarizes and systematizes the concept of organizational innovation, as well as concepts related to knowledge and skills;
– Identify and analyze the processes of competence development used by companies.
– Construct a typology of forms of organizational innovation which will enable help build a framework for analysis of the practices of organizational innovation and help create models of implementation.
– Create a skills development model to facilitate the implementation and diffusion of organizational innovation in companies so that they become more competitive.

6 Conclusion

Despite the duality that the powers are ultimately they are a grouping of knowledge of individuals and / or groups that can generate guidelines to ensure the sustainability and competitiveness of organizations.

This research tries to make an approach to the innovation skills needed, to implement a culture of innovation in organizations.

The innovation processes are influenced and facilitated by the way the organization is structured and by the way the top management stands before them.

This research proposes the implementation of a model of skills development, identifying skills in the most relevant areas of an industry. Besides the constraints of the Portuguese business which are related to issues of culture dominated by small and family-oriented, structural enterprises skills and knowledge can lead to changes and to innovation promotion.

In this context this research has an important role to play because identifies soft skills that can lead to innovation.

In conclusion it's possible to say that the skills and the knowledge of the organization can lead to success.

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Evaluation of the thermal comfort in classrooms

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ABSTRACT: In this paper, we present our main results of the post occupancy evaluation of thermal comfort of two primary schools constructed following the same plane, situated in two different climate zones. The first stage of the work consisted on measurements using meteorological equipments. These measurements are used to quantify the physical parameters of the thermal atmosphere, such as temperature, rate of relative humidity and wind speed prevailing inside classrooms. The second step aims to support the results of the first stage; and it is a psychological investigation using inquiry with users.

KEYWORDS: evaluation, thermal comfort, psychological factors, building school, type plan.

1 INTRODUCTION

The architecture of school building has the duty to facilitate the learning of all the pupils, besides the comfort which it has to get them, it must be flexible and it doesn't oppose the evolution of the pedagogies. The reflection on the school conception has to arouse the architects and the decision-makers, on the pupil as the user of a space of learning on one hand. On other hand, the possibility of offering to the teachers a favorable work environment. However, they are forced to answer one of the major questionings of the domain which is: «*how can the school architecture contribute to the success of the pupils?* ». [1] The current tendency of the school construction favors the multidisciplinarity, judging that the only architects are incapable to answer this question without collaboration with the teachers, the doctors, the psychologists etc.

Recently we attended the appearance of several works and researches which aim to estimate the school climate in its various aspects, which are psychological; social either physics (fig.1). This last aspect is considered as prevailing and the architect is the first responsible for the physical comfort level (thermal, lightning, sound) offer by the school building.

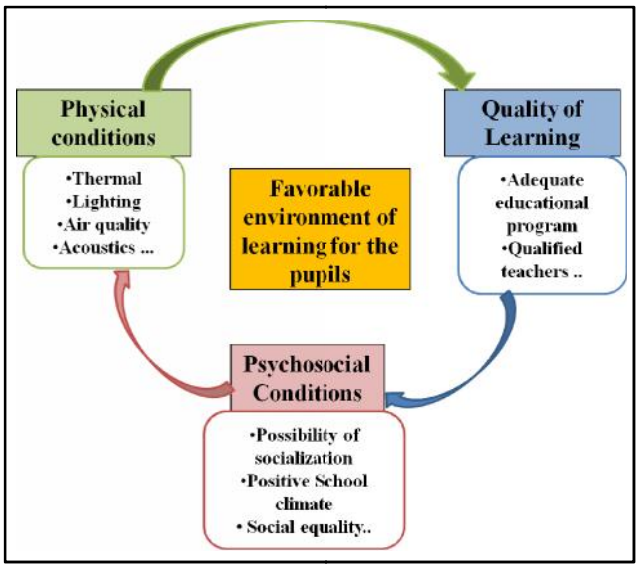

Figure 1 Conditions required for a favorable school environment.

In this work we shall be interested in one of the parameters of the physical conditions, namely the "thermal parameter".

2 Objectives of the research

The major objective of this research consists on an evaluation of the thermal comfort offered by a typical plan implanted in different climatic zones, and it also aims to:

- List the impacts of the internal thermal atmospheres on the health and the behavior of the pupils.
- List the parameters influencing the thermal comfort in a typical plan in two zones and for two seasons.

3 The typical plan of primary schools in Algeria

After the independence, Algeria knew a big mass construction of schools. As a matter of fact, the majority of the constructed primary schools since, obey to typical plan proposed by the Ministry of Education (table1).

This typology is characterized by a simple architecture, and classic and conventional building materials (concrete, brick). The building is conceived in the form of mono-orderly block, with a stairwell assuring the vertical circulation, and passageway serving as horizontal circulation. This plan is reproduced since the seventies on the whole national territory, without considering weather conditions specific to every zone. This plan has not only neglected the climate but also the psychological needs of the children.

Figure 2a Example of school built according to the typical plan

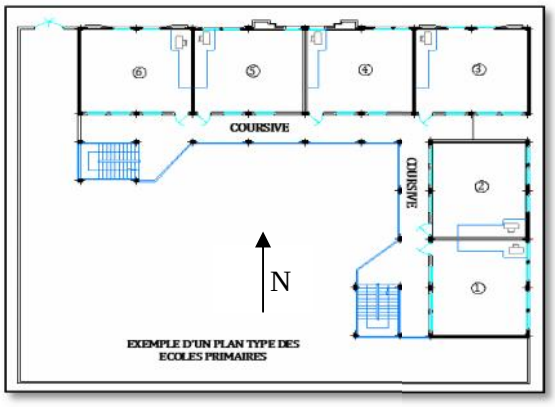

Figure 2b Example of school built according to the typical plan.

Table 1 number of school built according to the plan [2]

Type	Characteristic	Number
Type A	3 classrooms	2 225
Type B	6 classrooms	4 460
Type C	9 classrooms	1 661
Type D	12 classrooms	2 953
Rate	64%	
Except type	/	6 554
Total	/	17 853

4 Weather conditions of the zones of study

4.1 Weather conditions of Algiers

Algiers is characterized by Mediterranean climate (zone H1a - wintry classification, E1–summer classification, according to the classification of climatic zones in Algeria), cold and rainy in winter and hot and wet in summer.

4.2 Weather conditions of de Biskra

According to the same classification, Biskra is situated in the zone H3a characterized by very cold winters with a very important gaps daily of temperature. The zone E3 is very hot and dry summers. [3]

5 Methodology of research

5.1 The in situ measures

The in situ measures aimed to quantify the physical parameters of the thermal conditions in classrooms during the occupation over two periods of the year and in two different climatic zones. During the campaigns of measures, we used three meteorological mini stations, type HOBO 512K. Every mini station contains a data logger, who receives information collected by four different probes (fig.3). This instrument can be installed in outdoors as in closed spaces.

The campaigns of measures took place in classrooms, as well as in outside space. The instrument is placed in the middle of classrooms at a height of 1.20 of the ground. (Fig.4)

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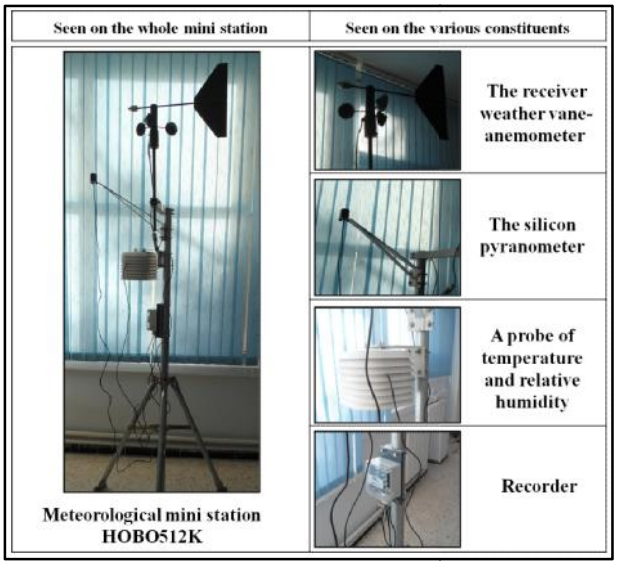

Figure 3 The various probes of the mini station HOBO 512K

Figure 4 Location of the mini station in classrooms

5.1.1 Winter campaign

- **In the presence of heating**

This campaign allowed us to know the usual working conditions of the users, namely the air temperature, the rate of relative humidity, and the air speed inside classrooms. (The period of taking of measures is in February, March 2013)

- **In absence of the heating**

We measured the same parameters, in presence of only calorie intakes of the users. This work is made in order to know the comfort level that this typical building can offers without the contribution of heating. (The period of taking of measures is in February, March 2013)

5.1.2 Campaign of the spring

This campaign had for objective to quantify the parameters of the thermal atmosphere in these schools during the hot period. (The period of taking of measures is in May, June, 2013)

5.2 Investigation by inquiry

We proceeded to an inquiry by questionnaire beside the teachers, which took place simultaneously with the campaigns of measures. Our sample of inquiry touched several primary schools having the same plan in the same region.

5.3 Treatment and analysis of data

To process the data collected during the experimental work we had turned to two software; the first one is Microsoft Office Excel, which we used to convert the registered values of mini stations of measure in graph. As for the results of inquiries was transformed into graph by means of a software of statistics even STATISTICA.

6 Discussion of the results of campaigns of measures and inquiries

Our results were obtained by the superimposing of the data of in situ measures on the data of inquiries.

6.1 Parameters of the thermal comfort on Algiers

6.1.1 During winter

- **Temperatures**

The registered values of temperature during the heated days in the presence of the pupils vary between 15°C and 22°C (fig.5).

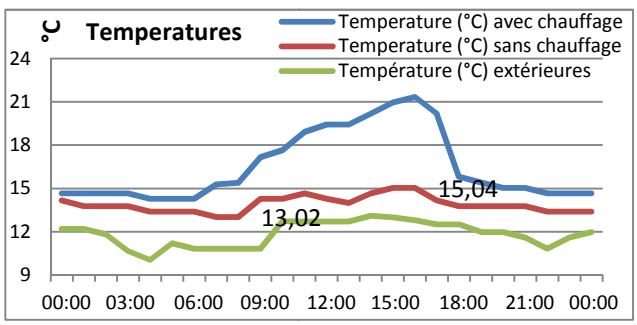

Figure 5 Fluctuation of the internal / outside temperature

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The values between 18°C and 22°C are considered as comfortable, knowing that the first hour of occupation where the temperatures were between 15°C and 18°C was considered as uncomfortable (fig.6). The situation of comfort is exclusively gotten by the contributions of the heating (fig.7).

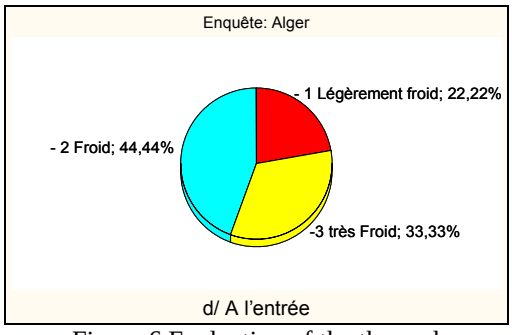

Figure 6 Evaluation of the thermal atmosphere in the entrance of classrooms.

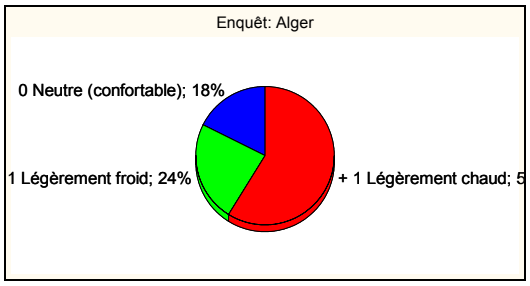

Figure 7 Evaluation of the thermal comfort during winter

The not heated day testified of the incapacity of this type of building to insure a minimum comfort without the presence of the heating. The internal temperatures did not exceed 15.04°C during the occupation (fig.5). The registered thermal conditions show the bad thermal performance of classrooms thing owed on one hand, in building materials used even materials conventional (brick in double partition for walls, wood and simple glass 3mm for openings). Of other hand by, the important number of facades exposed to the outside climate (3 façades in the majority of classrooms).

In the face of these conditions, the North / South orientation of classrooms presented an atmosphere better than classrooms oriented East/West, but who remains all the same uncomfortable. (In absence of heating)

- **The rate of relative humidity**

The relative humidity is considered as an important element of the thermal comfort, its fluctuation influences the sensation of the comfort.

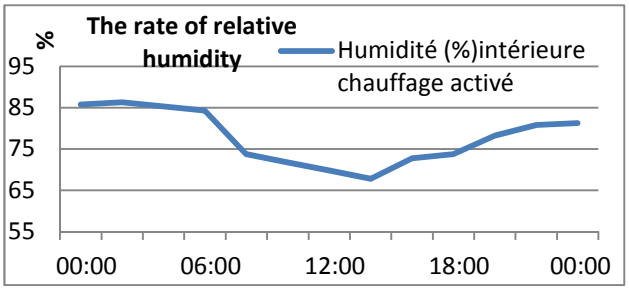

Figure 8 Fluctuation of the rate of relative humidity

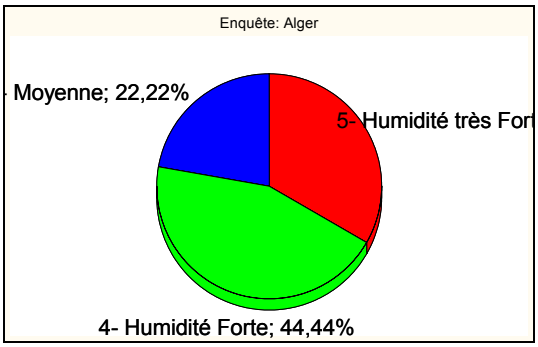

Figure 9 Evaluation of the rate of relative humidity

The values of the rate of humidity registered inside classrooms that turn the North / South either East/West varies between 68 % and 80 % (fig.8). This rate is considered by investigated raised and harms in the health of the pupils (fig.9). We dismiss these important rates of humidity to the shape of the building.

- **The draft**

During winter, the presence of the draft is judged as useless even unwanted; set apart some investigated which require its presence to evacuate the burned gas (produced by gas heating). The values registered (the air speed was 0 m/s), shows this report.

These conditions make that the teachers of the investigated primary schools are satisfied by the thermal atmosphere of classrooms (in the presence of the elements of heating, thus important energy consumption). In spite of this satisfaction they give evidence all the same that these conditions have an incidence on the health of the pupils as well as their behavior.

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6.1.2 Impact of the internal thermal winter atmospheres on the pupils

Table 2 Behavior of the pupils according to their teachers

Behavior	Rate	Causes
Absence	80%	The frequency of the diseases during the period wintry (see board 3).
Laziness	56%	The used heaters (gas heating) reject (CO) which concentrates inside classrooms as well as rate of relative humidity raised cause the laziness of the pupils.

Table 3 The frequent diseases according to their teachers

Diseases	Rate	Causes
Grippe/ Rheum	82%	Every year the schools of the North record during winter significant number of pupils affected by the rheum. This situation is due to the thermal shocks (absence of intermediate spaces between the inside and the outside).
Allergy	65%	It is caused by molds which appear on the walls of classrooms; which are caused in their turn by the high rate of humidity.

6.1.3 During spring

- **Temperatures**

The day of the investigation was considered as comfortable by approximately 70 % of the investigated. The temperatures of this day were between 24°C and 27°C in the presence of the pupils (fig.10), these temperatures are not constant during the season.

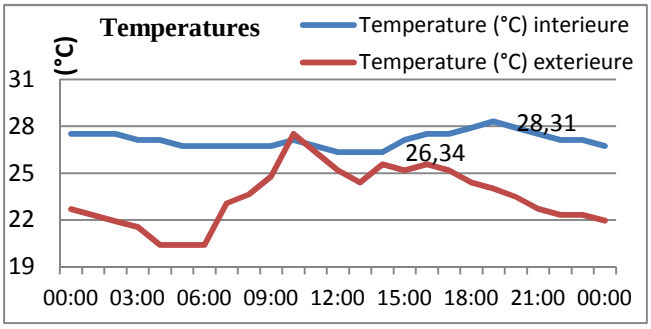

Figure 10 Fluctuation of the internal and outside temperatures

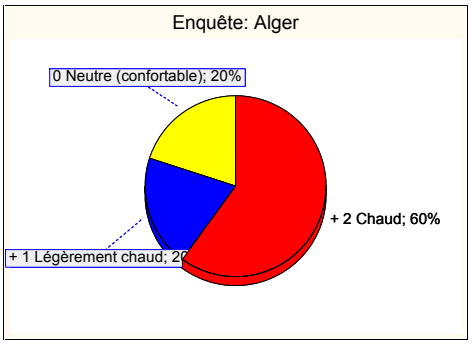

Figure 11 Evaluation of the thermal comfort during spring

The dominant thermal atmosphere on the whole season is considered as uncomfortable, thus hot, for approximately 60 % of the respondents of our investigation (fig11), with the presence of a nuance between the orientations in favor of the North / South orientation.

We note here, the absence of means of cooling except for the exercised control over the openings which serves sometime to create a comfortable climate inside classrooms.

- **The rate of relative humidity**

During spring the rate of humidity is considered, by the investigated, average, and the registered values confirm this appreciation, these values do not exceed the 60 % during the occupation of the classroom (fig.12). This why we judge that the humidity does not cause nuisance as in winter.

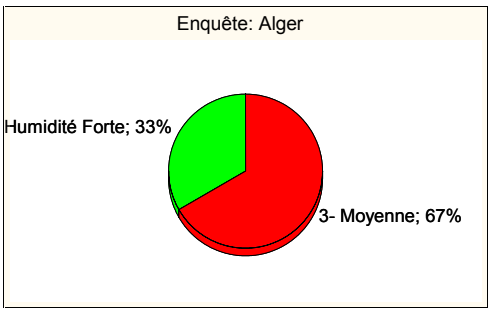

Figure 2 Evaluation of the rate of humidity

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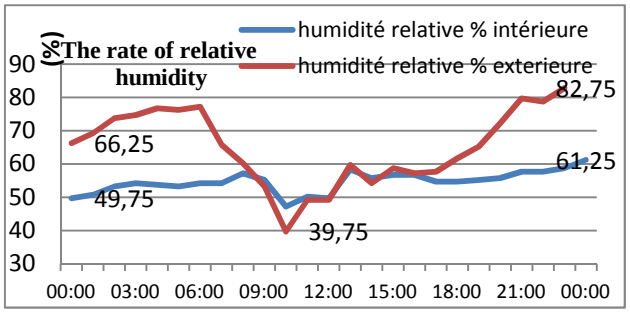

Figure 12 Fluctuation in the rate of relative humidity

- **The draft**

The presence of the draft in classrooms is desirable even essential to decrease the temperatures and evacuate the vitiated air inside the classroom.

On Algiers fresh wind in summer blow of the North and the North / West, of this fact the North / South oriented classrooms benefit from a draft better than East/west oriented classrooms, what explains the results of evaluation which are in favor of the North / South orientation (fig.14).

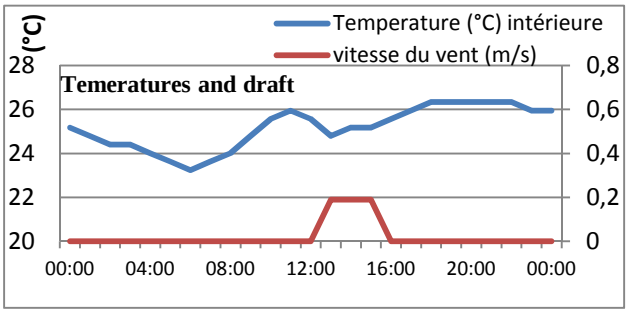

Figure 3 Fluctuation of the temperature according to the draft in classrooms oriented North/South

The thermal atmospheres offered by the plan proposed by the Ministry of Education are proved uncomfortable during the hot period. The led investigation revealed the bad quality of the working environment of the teachers and the impact of this latter on the health and the behavior of the pupils.

6.1.4 Impact des ambiances thermiques intérieures du printemps sur les élèves au nord.

The following boards summarize the diseases and behaviors the most wide-spread according to the investigated of the Northern region during the hot period.

Table 4 The behavior of the pupils in classrooms

Behavior	Rate	Causes
Loss of concentration	83%	The teachers consider that the pupils concentrate badly when the temperatures are raised, what explains their hanging laziness during the afternoon, when the temperatures are higher than the morning.
Laziness	72%	

Table 5 The most frequent diseases in classrooms

Diseases	Rate	Causes
Irritation of the skin	72%	It is provoked by the excessive sweating due to the temperatures raised with the presence of the dust
Headaches	61%	The prolonged exposure of the pupils in the heat entrains headaches at the child according to the teachers.

6.2 The parameters of the thermal comfort on Biskra

6.2.1 During Winter

- **Temperatures**

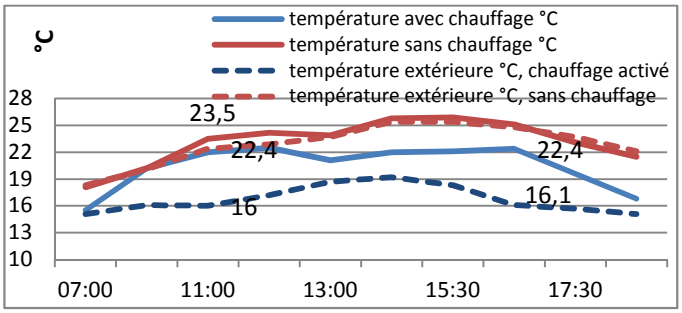

Figure 4 Fluctuations of the temperatures

We often think that the south region of the country is hot during practically all the year; therefore, the presence of heating is not essential. This study, thus took the care to demonstrate the opposite, such almost all of questioned teachers shows the necessity of the heating during the wintry period (fig.16)[1].

[1] . This evaluation concerns all the investigated schools of the region and not only the school object of study.

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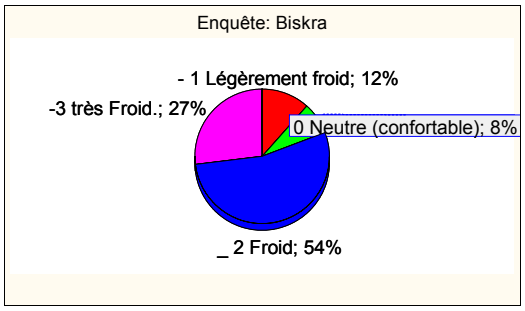

Figure 5 Evaluation of the wintry thermal comfort

The internal / outside temperature difference, of the not heated day which does not exceed 0.9°C (fig.15)[2], demonstrates the bad thermal behavior of the walls of classrooms. The important thermal losses are due to the significant number of facades exposed to the outside climate and the used material of construction. In Biskra as in Algiers, the North / South orientation of classrooms is more favorable than the orientation East/west.

- **Rate of relative humidity**

The investigated teachers of the south region seem to be satisfied by the rate of humidity relative of their thermal atmospheres (fig.18), and the registered values confirm this report, which varied between 45 % and 60 % inside classrooms during the occupation (fig.17).

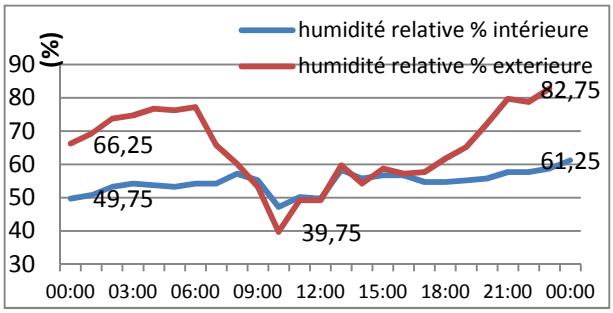

Figure 6 The values of the rate of relative humidity

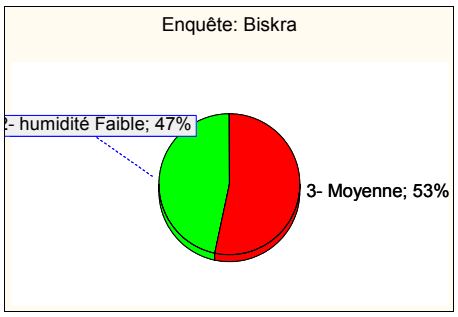

Figure 18 Evaluation of the rate of humidity

[2] . The day programmed for the taking of measures without heating was characterized by a moderate climate, what falsified our results.

- **Draft**

The air speed inside classrooms is nil, however even the users do not show the need to have a draft inside classrooms.

On this region of the country, we were not able to reach all the expected results, but we revealed other problems. As a matter of fact, the working conditions in classrooms, in south region in winter, are very unfavorable.

6.2.2 Impact of the internal wintery thermal atmospheres on the pupils in Biskra

As a matter of fact, the working conditions in classrooms, in south region in winter, are very unfavorable, and cause nuisances for the pupils and the teachers.

Table 6 The behavior of the pupils in classrooms

Behavior	Rate	Causes
Hyperactivity	83%	The pupils try to get themselves a little of heat with the movements what explains their hyperactivity in classrooms.
Loss of concentration	79%	The cold limits the level of concentration of the pupils.
Desire to go out	67%	The investigated teachers show their dissatisfaction towards the repeated exits by the pupils who are due to the presence of the diseases (see board 7)

Table 7 The most frequent diseases in the school space in Biskra

Diseases	Rate	Causes
Polyurie	80%	The permanent exhibition to the cold atmosphere cause at the child's of the diseases such as the polyurie which causes finally the desire to go out. As well as the grippe and rheum.
Grippe/ Rheum	58%	

6.2.3 During spring

- **Temperatures**

The internal temperatures of classrooms vary between 25°C and 37°C during the occupation (fig.19). This

margin is considered uncomfortable by most part of the investigated. Therefore, they demand the presence of means of cooling to soften these conditions (fig.20).

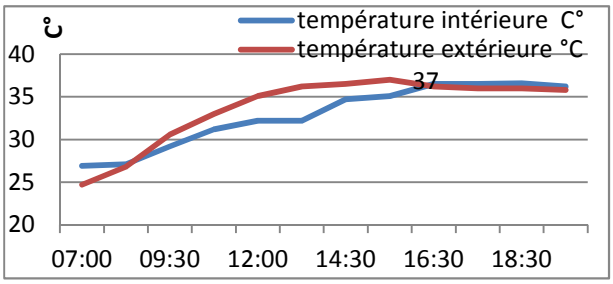

Figure 7 Fluctuations of the temperatures

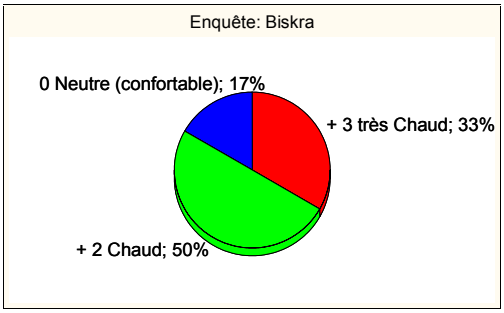

Figure 20 Evaluation of the thermal comfort

- **The rate of relative humidity**

To Biskra, during the hot period the internal rate of relative humidity in classrooms does not exceed 29 % at the entrance of the pupils, to vacillate around 23 % along the day (fig.21). This atmosphere is considered as dry (fig.22).

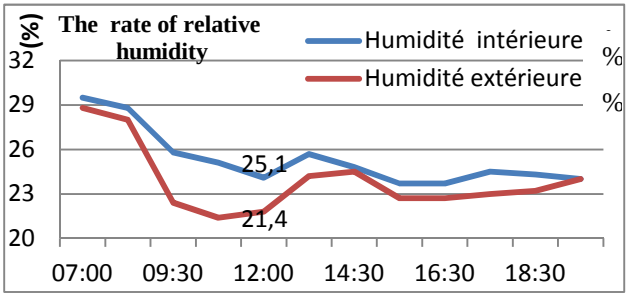

Figure 8 The values of the rate of relative humidity

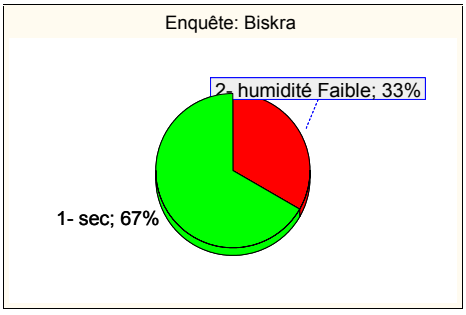

Figure 21 Evaluation of the rate of humidity

The malaise expressed by the investigated towards the very low values of the humidity demonstrated that finally the above-mentioned temperatures could be comfortable if the rate of relative humidity was higher.

- **The draft**

The draft is an element dominant and looked for in spring to reach certain comfort, but the frequency of the storms of winds of sands makes that the users asks for it with limitation, knowing that winds summer are dry (sirocco).

6.2.4 Impact of the internal thermal atmospheres of the spring on the pupils of the South

Table 8 The behavior of the pupils in classrooms

Behavior	Rates	Causes
Loss of concentration	85%	The raised temperatures and the lowed rate of relative humidity provoke the loss of concentration and the laziness at the child inside classrooms.
Laziness	57%	

Table 9 The most frequent diseases in the school space

Diseases	Rate	Causes
Irritation of the skin	78%	It is caused by the excessive sweating due to the raised temperatures with the presence of the dust
Headache	71%	The prolonged exposure of the pupils in the heat entrains headaches at the child.

This typical building, demonstrated its failure to offer a minimum of thermal comfort to the users, in the hot period. In absence of active solutions (ventilator or air conditioner), the manipulation of openings is proved not effective in this zone.

The schools of the south region suffer from a lack of equipment of heating and cooling, what returns the processes of teaching and learning more difficult. In this situation the architecture of the school building had to take into account these lacks. But in reality the conception of the school buildings is only adapting, according to the ground, the typical plan proposed by the Ministry of

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Education and makes no reference to the climatic data of the zone of setting-up.

7 CONCLUSION

This study allowed us to know the real quality of the internal thermal atmospheres offered by the typical plan of primary schools, in two different climatic zones and during two seasons.

The internal thermal atmospheres of classrooms are considered as bearable in winter in the schools of the North of the country. This situation is not bound to an adapted architecture, but rather to use of the active solutions basing on the energetic consumption. During spring the thermal conditions are acceptable more at least.

Whereas in the South, this study shows us the inadequacy of the internal thermal atmospheres in these schools during both seasons. On other hand, the lack of equipments which could remedy the failures of the architecture of the school building accented the sensation of discomfort.

We note that:

The influential factor of the wintry thermal comfort in the *north* is the **rate of relative humidity**, and in the *South* is the **ambient temperature**. The users of the schools of the South suggest temperatures higher than the users of the same space situated in the North.

During the hot period, the dominant factors in the *North* are the **ambient temperature** and **the draft**, in the *South* those are **the rate of relative humidity** as well as **the draft**.

These results confirm the necessity of considering the specific climatic parameters of every zone in the process of conception and realization of buildings.

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Building Articulation and Integration of Work based Training

Author: Dr W.Goosen

Abstract- Building articulation and integration – A systems approach.
The purpose of this paper is to share experiences and findings from a research study on the possibilities of articulation and integration of work based training. The paper considers the relevance of accreditation for students as advocated by Brittingham (2010) and business as motivated by De Coi (2007).

The study reflects a grounded theory (Charmaz 2000) approach that draws from a literature study as well as feedback from 169 participating companies and the researcher's personal experience. The findings suggest that, although non-formal learning experiences can articulate as credit in formal learning programmes, the development of personal purpose and contextual awareness is central to effective human development. It is this awareness that facilitates integrated job functioning and enables the individual to interpret, synthesize and evolve workplace activity to meaningful business outputs (Maggelan 2010).

I. INTRODUCTION

From a business perspective, the impact of a Corporate Qualifications Framework (CQF) on strategic planning needs to be considered as the research investigates the possibility that the relationship between strategic planning and skills planning is functioning less than optimally within South Africa. Similarly, the relationship between performance management, strategic management and human resource management is to be explored. In keeping, the relationship between education, training and certification needs to be compared with strategic needs and performance management requirements as the basis of future articulation. Knowledge creation and knowledge formation in educational institutions are driven by research in industry and academic decision (Veness, 2010). With the introduction of the Organizing Framework for Occupations, it can be deducted that such type of thinking should somehow become part of the curriculum of training (Robertson, 2011). Such job description should function as a performance standard, and be useful in obtaining formal qualifications (Moore, 2011).

II. LITERATURE SURVEY
THE CASE FOR ACCREDITATION

Pharasad and Bhar (2010) give an overview of the Indian technical education system and show the value of accreditation as quality improvement and quality assurance of educational programs. Bear (1991) suggests accreditation as a process in which certification of competence, authority or credibility is presented. In the United States of America, organizations that issue credentials or certify third parties against official standards are themselves formally accredited or certified by accreditation bodies referred to as "accredited certification bodies" (United States Department of Education, 2011). The accreditation process in education and training suggests that the provider of

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tuition, content and assessment and moderation, as well as certification practices, are compliant with predetermined benchmarks (United States Department of Education, 2011).

Accreditation practices define the ultimate standards or benchmarks against which a measurement could take place. Only with a known benchmark can there be measurements, articulation, deviations or gaps identified and plans devised to manage such gaps (Crossroads, 2011). Educational institutions tend to recognize fellow accredited institutions, as this creates a basis for comparison (Bear, 1991) and thus articulation.

III. THE RELEVANCE OF ACCREDITATION TO BUSINESS

According to WorldWideLearn (2010) accreditation ensures a basic level of quality in the education received from an institution. Thus, accreditation for business implies that "achievements" (competency) could potentially be benchmarked and thus industry performance could be plotted against the same, leading to the satisfaction of the third objective, namely that a gap analysis becomes possible (De Coi, Herder, Koesling, Lofi, Olmedilla, Papapetrou and Siberski, 2007). Competence is viewed as effective performance within a domain/context at different levels of proficiency (Cheetam and Chivers, 2005). De Coi, et al. (2007) further elaborates that competencies are described as reusable domain knowledge. They suggest that a model, representing competencies, describes what a competence is and how it is composed of sub-competencies.

Earning internationally recognized accreditation, informs the public about the educational quality derived from being held accountable for international standards (Bear, 1991). However, in South Africa, the trend is towards local accreditation as opposed to international accreditation (Further Education and Training Colleges Act, 2006). "Accreditation can also serve as a selection criterion to assist a company in identifying high-quality schools from which to recruit" (Trapnell, 2010:68). Accreditation allows for articulation and to compare qualifications of employees with one another.

IV. ACCREDITATION AND BUSINESS NEEDS

If ways could be developed to accredit training done in-house, to obtain credits towards the attainment of qualifications, it may enable the individual to consolidate personal development, academic learning and corporate performance. An employer may have high quality in-house training programs that could be considered for accreditation on a formal Qualifications Framework to earn credits. Ball (1989:64) believes that companies often have employees that perform very well and beyond expectations. "Often, these employees will not have the best academic credentials." Such individuals would do very well if their work-based learning could count for credits (articulation) towards qualifications (Ball, 1989:64).

According to Kingston (2006) the Leitch report was developed to put employers at the heart of determining skills and qualifications needs. This report makes it easier for employers to have their own training accredited (Kingston, 2006). A number of

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employers have already successfully been involved, including McDonald, Network Rail and Flybe. According to Business Link, these three companies are now recognised awarding organizations. Others, including Honda have had their training accredited through working in partnership with existing awarding organizations.

Employer Based Training Accreditation (EBTA) (2011) is about finding ways to make the impact of in-house training more explicit (Coeducate Project, 2011). EBTA works with businesses to establish whether a university can accredit their internal training. It also supports employers who want to further develop training and build towards formal national qualifications. Government funding as part of its strategy to support business growth and development supports EBTA's services. The real, academic benefit of EBTA is however that external verification of the quality and standard of in-house training and matching in-house training to national qualification standards becomes possible. In addition, the process can assist in developing capacity to improve skills. Effectively, this approach thus quantifies or measures non-formal training (EBTA, 2011). The development of such normative skills enables us to compare, remediate, review and re-develop in order to achieve new heights of innovation (Charlton, 2008).

V. VOCATIONAL ACCREDITATION

Vocational accreditation refers to measuring the vocation against a benchmark. Thus, supporting the notion that the industry or the job requirement should determine the level of required learning as opposed to the schooling system (Beere, 2007). The modern application of vocational accreditation does not exclude the academic notion, but rather embraces the practice thereof (Web-Institute-for-teachers.com, 2000), thus enabling articulation.

According to Bulgarelli (2009) the Council of the European Union adopted a resolution in November 2002 in Copenhagen for the promotion of such vocational accreditation. Policy documents provided the initial impetus for the Copenhagen process, a strategy that aims to improve the performance, quality and attractiveness of Vocational Education and Training (VET), focusing on the development of a single framework for the transparency of qualifications and competences, credit transfer in VET and quality assurance. These priorities have been successively confirmed by the Maastricht (2004), the Helsinki (2006) and the Bordeaux (2008) communiqués as well as by the recently approved council conclusions on a strategic framework for European cooperation in education and training (Bulgareli, 2009). Accordingly, a common quality assurance framework (CQAF) was developed in Europe. This enables the accumulation of credits in both the workplace and classroom, to measure the attainment of qualifications and also, the level of performance at which a person operates (Capella University, 2011).

Workplace learning is often introduced as workplace training in order to improve employee skills. Workplace learning can also happen via coaching and mentoring, observation or by repetition, enabling the development of an experience base (Kerka, 1998). According to the University of Massachusetts (2011) workplace learning is offered in various forms,

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such as supervisory training and management development.

In South Africa there are two ways to address the problem. Firstly the workplace could apply to become an accredited provider (SAQA, 2011). The second is to outsource the alignment and quality assurance to an existing provider. Such workplace learning could therefore, possibly become credit bearing within a formal qualification. Credits could possibly be accumulated in the workplace that may be transferred to formal qualifications (Capella University, 2011).

VI. THE CASE FOR ARTICULATION

Although accreditation could serve as the basis for skills or education standards, a review of accreditation without considering reciprocity and articulation, is not complete. According to Beach (1906) education reciprocity followed after trade reciprocity. The practice of reciprocity refers to the formal / informal recognition of qualifications between countries or systems (Colten, 1981). Reciprocity and articulation in this research is important as it pertains to the system of recognizing different educational programs (Tammaro and Weech, 2008). Reciprocity is the precursor to articulation. However, reciprocity operates as a system that compares the cross recognition of such qualifications and is also focused on the “how” of the recognition. As such, the United States Department of Education (2010) believes the term “reciprocity” is used widely across the country, but that the true meaning of the term is often overlooked, namely to enable articulation. The reciprocity is governed by the Interstate Agreement developed by the National Association of State Directors of Teacher Education and Certification (NASDTEC) (Plymouth state University, 2011). However, reciprocity does not guarantee that a license in one state can be "traded in" for a license in another state (Plymouth state University, 2011). Thus, decisions of reciprocity vary from state to state and are not governed by the Interstate Agreement.

Not all countries seem to have the ease of such reciprocity thinking. In some parts of the world, standards vary hugely from country to country and sometimes even within countries (Bear, 1991). Competent, certified and qualified individuals provide a skilled labour force. Employers need to have a framework to be able to know how to compare qualifications with one another. Where career paths are well articulated, it aids in the recruitment, selection and retention of skilled workers. One such a system is to create an Organizing Framework for Occupations (OFO). As such, the Canadian National Occupational Standards and the Tourism Techniques Articulation Project, aimed at integrating relevant national occupational standards into the curriculum of Cégep de Saint-Félicien, and achieving reciprocity between the Canadian Tourism Human Resource Council (CTHRC, 2010), allowing students to acquire a variety of management and occupation-specific skills. Upon graduation, it also leads to the automatic receipt of an emerit certificate for occupational knowledge. Individuals who receive this emerit certification could also receive recognition toward the Tourism Techniques program at Cégep de Saint-Félicien. As this sets a central benchmark of occupational standards, the same standards could be used in measuring the skills and performance of employees.

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To meet future needs, the Canadian Tourism Human Resource Council (CTHRC) (2010) suggested the development of a foreign-credential-recognition (FCR) model. It was suggested that the FCR model should be developed and connected with the sector's existing occupational standards as well as its professional certification (credential) programs.

In 2005, a comparative study of the CTHRC and the Caribbean Professional Certification Systems conducted a review of selected international credential-recognition systems. The study considered the systems and identified what is common amongst them and relevant to Canada. Similar work has been conducted on establishing joint recognition systems between South Africa and the European Union in skills that include industries such as Marketing and Hairdressing (Goosen: 2005). The Canadian project also looked at identifying concerns associated with establishing an FCR model (CTHRC, 2010). Although much related work has been done in South Africa, the South African drive in terms of a formal FCR model still needs to be formalized.

Corporate qualifications frameworks

Once the workplace articulates to formal standards, albeit by becoming a provider or aligning with one, programs offered at the workplace could possibly become credit bearing. As such, these programs obtain a position on the National Qualifications Framework. However, it may be unlikely that the workplace learning would constitute an entire qualification. As such, the learning so undertaken, could potentially present a partial qualification that addresses the direct needs of the workplace (Hong Kong Education Bureau, 2008). Such collection of training programs could constitute a Corporate Qualifications Framework for the workplace used by learners and employees to plan how these credits could be earned for career advancement, as wells as for formal qualification (Capella University, 2011).

Credit Accumulation

Where a strategic plan can be used to determine the required human capital in business and industry skills used as credit in such benchmarks, it could be possible to use such a system to determine normative skills gaps. This implies that there will be a need to collect and accumulate credits on a peace meal basis. Aberystwyth University (2011) discusses a concept called "Credit Accumulation and Transfer Schemes (CATS)"which is used by universities in the United Kingdom to monitor, record and reward "passage through a modular degree course and to facilitate movement between courses and institutions." It is also possible to equate CATS with the Scottish Credit and Qualifications Framework (SCQF, 2011) and the European Credit Transfer and Accumulation System (ECTS) (2011).

According to Adam (2000) the task of the Leiria International Seminar was to discuss workable alternatives and build consensus about Credit Accumulation and Transfer Systems. This seminar was one of the international seminars agreed to in Helsinki. The purpose of this seminar was to discuss credit accumulation and transfer systems in the context of the Bologna process and the linkages to lifelong learning. Adam suggests that the experience gained by the European Credit Transfer System (ECTS) provided the framework for much of the national and international

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development of credit accumulation and transfer and the internationalization of higher education.

During the same seminar, the Minister of Education from Portugal stressed the need for more student and teacher mobility to aid European integration and more harmonization between different national educational policies. This would also lead to more competition between European systems, which would improve and sharpen individual educational provisions.

VII. THE RESEARCH QUESTION

The research question considers the role of the workplace and non-formal learning opportunities, for possible application as formal learning. Thus, the question is whether such learning could be quality assured, assessed or RPL'd to articulate into formal qualifications.

VIII. RESEARCH OBJECTIVES

1. To demonstrate how non-formal learning and competencies can be aligned (articulated) to educational standards. For this, unit standards and / or other education and training qualifications could be utilized, in part or whole, as standards of required competency in South Africa.
2. To demonstrate how non-formal training can be assessed against formal benchmarks and become credit bearing (articulate). The study investigated whether industry experience, workplace learning, competency and non-formal training programs compares favorably to national benchmarks reflected in formal education programs, in an attempt to assess and quantify human capital within an organization.
3. To demonstrate how a Corporate Qualifications Framework(CQF) can be developed whereby industry can quantify and manage human capital for purposes of performance management.

IX. THE RESEARCH QUESTION

The research considered the possibility of comparing industry experience, workplace learning and non-formal training with formal learning content, level and outcomes (articulation). The question extended to whether industry can quantify such human capital for skills assessment. The research intended to address the inability to "count", measure, recognise or compare skills, irrespective of the origin of such skills.

X. Research design

The literature study investigated how educational thought about articulation evolved. In addition, the strategic objectives in 169 organisations were analyzed to determine the required tasks to be performed by employees. These tasks were then benchmarked against the system of educational standards and unit standards registered on the NQF. A grounded theory approach was followed in order to demonstrate:

- How non-formal training can be assessed against formal benchmarks.
- How non-formal programs can become credit bearing.
- How a Corporate Qualifications Framework can be developed whereby industry can quantify and manage human capital for purposes of performance management.

XI. THE RESEARCH ASSUMPTIONS

- Unit standards and / or credits for training are acceptable in industry
- Industry accepts the measuring instruments of the NQF

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• Industry stands to gain from human capital quantification
• Occupational profiles and job descriptions can have credit values
• Education institutions will accept the principle of non-formal credit accumulation.

XII. RESEARCH METHODOLOGY

The methodology consisted of gathering data, reflection and action planning.

a) The research process is reflective in as much as it "reflects" or considers the position of learning, skills and competency from various perspectives. The methodology further reflected on the role of future qualifications and job descriptions, including benchmarks related to education.
b) The potential CQF could possibly serve as an emergent theory. This may suggest a management system that informs business decisions about skills needs in a normative way, thus forming theory emerging from the data. The research started with a particular set of data or facts and investigates emerging theory from such data. Thus the research is "grounded" on existing data.

XIII. DATA COLLECTION

The population, from which the sample was drawn, was Companies within the services industry in South Africa. Companies were invited to participate, based on the following sampling criteria:
• Companies must be service seta members
• Companies must have been levy paying members for 5 years or longer
• Companies must have a minimum of 30 and a maximum of 200 employees
• Companies must employ a qualified SDF with at least 5 years experience

From the above, 169 qualifying respondents were identified. Concepts and categories were developed from personal experience, literature survey and research questionnaires. Skills Development Facilitators completed questionnaires.

The steps that were followed
1. Identifying the service industry as target sector
2. Identifying and listing of companies in industry whose training will be measured
3. Conducting formal quantification of human capital from selected companies
4. Interacting with Skills Development Facilitators to determine their opinions
5. Auditing skills set of companies - assessment of non-formal learning outcomes
6. Comparing non-formal learning outcomes with formal learning outcomes
7. Building an in-house Corporate Qualifications Framework
8. Identifying shortcomings

Data analysis
The analysis of data included:
• Inspecting Data - Identification and qualification of participants to partake.
• Cleaning Data - Consideration of the number of participants that support and are able to implement a CQF.
• Transforming Data – Investigating the ability of participants to unpack human capital required in relation to a strategic plan.
• Modeling Data - Align required skills to job descriptions and educational standards.
• Allocation of functional skills to jobs, as required tasks, from where the alignment to educational standards will commence.
• Modeling Data into the development of an integrated human capital management framework.

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The data was tabulated in a spreadsheet format, known as data tables. Data tables generally present numerical data inside of a grid format. The findings of the research were documented in a way that enables results of companies to be compared with each other.

XIV. THE RESEARCH STAGES

Stage 1 involved documenting and analyzing a record of the researcher's personal experience and exploring concepts and categories from the documented experiences.
Stage 2 involved the analysis of the literature survey. Concepts and categories developed from the literature survey. Stage 3 involved the finalization and dissemination of the research questionnaire that was completed by 169 SDFs. The SDFs represented different industries from the service industry including industry expert practitioners and training providers.

As a result of the data gathered in stages 1 and 2, a research questionnaire was designed in an attempt to gather more information from participating stakeholders. The research questionnaire's intent was to gain insight into the perceptions and experiences of organisations with regard to human capital management and to assess the validity of developing categories as identified during stage 1 and 2. Stage 4 involved the interpretation and analysis of data gathered from the researcher's personal experience (Stage 1), the literature survey (Stage 2) and data gathered from the 169 participating companies (Stage 3). During this stage the researcher became involved in an iterative process of reflection and triangulation, identifying relevant concepts, categories and emerging themes.

XV. RESEARCH FINDINGS

For purpose of the research report the personal experience of the researcher, the findings from the literature review and the results from the research questionnaire are reported separately. This is done in respect to the complexity of information resulting from the research process.

Concepts identified from researcher's personal experience

The personal experience of the researcher confirmed specific concepts related to the objectives of the study:
• To demonstrate how non-formal training can be assessed against formal benchmarks and how non-formal programs can become credit bearing.
• To demonstrate how a benchmark system can inform GAP analysis.
• To demonstrate how a Corporate Qualifications Framework can be developed to quantify and manage human capital for purposes of performance management.

A total of 57 concepts were identified by the researcher in reflecting upon his experience in the field of human capital management.

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Categories identified from concepts related to the researcher's personal experience

The researcher has clustered the 57 concepts into 6 categories.

Nr.	Category
Category 1:	Ill-defined human capital context.
Category 2:	Lack of detail regarding job roles and organisational roles.
Category 3:	No integrated framework of workplace learning and formal learning.
Category 4:	Limited connection with higher purpose.
Category 5:	Organising Framework for Occupations (OFO) needs further detail.
Category 6	Education needs new approach.

Table 1: Categories Developed from Personal Experience

The researcher classified his personal experience into different phases, as related to time, employment and consulting. In view thereof, the 57 concepts were clustered along these parameters, into the above 6 categories. Category 1, 2 and 3 informs research objective 1 and underlines the problems of strategic planning and its limited application in skills planning. The lack of clear job descriptions and a lack of an integrated human capital framework has also been indicated as limiting factors in aligning strategic planning with human capital management within organisations. Category 4 indicates the need to develop an increased contextual awareness of higher purpose. This informs one of the research objectives related to "how" Corporate Qualifications Frameworks" are to be developed. The concept implies that caution should be exercised not to develop frameworks without considering the importance of contextual awareness. Category 5 suggests the need for refinement of an Organising Framework for Occupations (OFO), thus relating to the objective pertaining to performance management. Lastly, Category 6 indicates the need for education reform. This category informs all of the research objectives.

The literature survey

The literature review provided important insight regarding the aim and objectives of the study. Of specific interest is aspects related to the objective to demonstrate how non-formal training can be assessed against formal benchmarks and how non-formal programs can become credit bearing. In the following sections the researcher will provide details regarding the concepts and categories identified during the literature review.

Concepts that developed from the literature survey

The literature survey confirmed 128 concepts. In view of the 128 concepts, 6 categories were identified:

Category 1 informs research objective 1 and underlines the role of executive management to engage strategically in defining required competence and aligning educational standards with business objectives. Table 2: Categories' that developed from the Literature Survey In line with the above, category 2, referring to the lack of clearly defined job roles, underlines the relevance of a Corporate Qualifications Framework in quantifying and managing human capital for purposes of performance management. Similarly, category 3, referring to limitations on integrated

frameworks for workplace learning, confirms the relevance of a Corporate Qualifications Framework. Categories 4 and 5 seem not to relate directly to any of the predefined objectives of the research. However, taking into account the aim of the study, as referring amongst other, to the quantification of human capital, one needs to consider the potential impact of contextual awareness, purpose and psychological effect on employees if such quantification of human capital does not materialize. Category 6 refers to the relevance of alternative education systems, which forms one of the cornerstones of the aim of the study in developing and establishing a framework for the assessment of non-formal training.

Nr.	Category
Category 1	Trend to use planning a basis for action.
Category 2	Lack of detail regarding job roles and organisational roles
Category 3	No integrated framework of workplace learning and formal learning
Category 4	Limited contextual awareness and understanding of purpose.
Category 5	Certification has a psychological effect
Category 6	Evolving construct needed for an alternative education system.

Table 2: Categories Developed from the Literature Survey

The research questionnaire

The research questionnaire evolved as a result from concepts and categories identified as part of stages 1 and 2 of the research. The questionnaire consisted of 12 questions and was completed by 169 respondents.

Concepts that developed from the research questionnaire

The Evaluation of the 169 reports confirmed 10 concepts as reflected in Table: 3

Categories identified from the concepts related to the questionnaire:

A logical clustering of the concepts confirmed 7 categories after the evaluation of the 169 reports as indicated in Table: 3.

Nr.	Category
Category 1:	Integrated strategic planning
Category 2:	Integrated Human Capital management system
Category 3:	Productivity
Category 4	Corporate Qualifications Framework
Category 5	Integrated systems reporting per person
Category 6	Performance management
Category 7	Higher level of contextual awareness

Table: 3 Categories developed from the research questionnaire

The research questionnaire was constructed to elicit comprehensive responses from participants in relation to the management of human capital. The questions were semi-structured and therefore allowed for interpretation and information sharing. Participants clearly demonstrated very specific group think on topics such as “the need for an integrated system of human capital management, benchmarking and credit accumulation” and “the need for a framework to address the issues of purpose, awareness and conceptual understanding at the workplace.”

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Categories 1 and 2 inform the objectives of strategic planning in developing required human capital and the development of a Corporate Qualifications Framework, as stated in objectives 1 and 4. Categories 3, 4 and 6 inform the objective of developing a Corporate Qualifications framework to quantify and management human capital for purposes of performance management. Category 5 relates to objectives 3 and 4, focusing on the importance of benchmarking performance against clearly defined job roles. Lastly, category 7 does not directly relate to a specific research objective.

However, it does raise the question of "how" a Corporate Qualifications Framework could impact on employees' performance and either motivate or demotivate performance.

Discussion

The non-formal and ad-hoc nature of human capital management within modern day organisations seems to reflect a systemic dilemma for human capital management specialists. Underpinning this seemingly systemic dilemma is the need for an integrated human capital management system to facilitate the effective utilisation of limited human resources within an emerging socio economic environment. As indicated by the feedback from the 169 respondents, performance and subsequently productivity is largely hampered because of limitations within the existing human capital management system. In addition to the ad-hoc nature of human capital management, ill-defined job roles and limited contextual understanding indicates a further dilemma for the economy at large. At the same time, employees experience confusion in job roles, leading in turn to loss of contextual understanding as well as potential loss in productivity. As human capital management seems to be inappropriately defined, the development of systems that should utilize workplace learning as an opportunity to award formal credits in education, are hampered. The formal education system does not have the capacity to engage workplace learning for purposes of awarding credits in formal learning programs. The resultant social and psychological effects are that learners in the workplace remain under-recognised for both their performance and learning efforts. Taking into account the 3 stages, during which the research was conducted, the involvement of 169 respondents, the identification of 197 concepts and the emergence of 19 categories concludes into 4 emerging themes.

- The role of strategic management in the development of an integrated human capital management system.
- The role of skills development as productivity driver.
- The role of non-formal learning in a formal learning environment.
- The role of awareness and contextual understanding.

The evaluation of the researcher's personal experience and the literature study suggests the development of a system that includes a long term approach to human capital development and management and in particular, the cultivation of a higher level of consciousness. The evaluation of 169 responses confirmed the need for an integrated framework that considers the need to address the above.

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Themes that emerged from the study:
Theme 1: the role of strategic management in the development of an integrated human capital management system. In the experience of the researcher, industry has a very limited understanding of the link between strategy and job descriptions, as well as limited ability to integrate job descriptions with performance standards and align such with education standards. From the identified concepts and categories, the researcher's experience indicated that the integration of strategic drivers within the human capital management appeared to be limited. The research indicated that the ability to link strategy to skills requirements and purpose of work is limited in both cognition and application within South African companies.

Findings from the researcher's experience, literature survey and research questionnaire, indicated that an organisational strategic plan could be used to determine required human capital within an organisation. The "lack of job descriptions developed from strategic planning, effective GAP analysis and human capital management per person" emerged as key components underpinning theme 1. In an attempt to contribute towards formalizing a framework for the assessment of non-formal training, participating companies were required to review their existing job descriptions and provide evidence that a performance measurement of staff have been conducted against a specific set of standards. In doing so companies could identify skills GAP's in terms of educational standards. Based on the results from the 169 respondents the vision and mission statements of each of these businesses were utilised to define a set of business objectives specific to each participating company. This process also illuminated the absence of "contextual awareness" in human capital.

Theme 2: the role of skills as a productivity driver

The researcher's personal experience indicated concepts and categories that suggest, " Job roles are not well defined". Given the "limited connection with higher purpose", a motivation level of employees seems to be low. Furthermore the introduction of the OFO in South Africa suggests that job profiles would be developed from which job descriptions and performance management systems will emanate.. Similarly the literature survey indicated concepts and categories that highlight the limited ability of the workplace to provide a sense of higher purpose to the individual. The need for an "integrated system" to manage human capital suggests a system that clarifies job roles and monitors performance against such job roles on a basis that addresses human purpose and productivity. The research aim "to develop and establish a framework for the assessment of non-formal training and the quantification of human capital" was partially addressed in this theme.

Theme 3: the role of non-formal learning in a formal learning environment
In the experience of the researcher very limited application of non-formal learning, as credits for formal learning, actually exists within South Africa. Current human capital management processes within South Africa seem to lack both "definition and integration", thus leading to hampering the notion of a system that could recognise non-formal learning in a formal context. The development of a human capital

management system that functions optimally should include “non-formal and informal learning as credits in a formal learning context”. In addition a “new approach for the education system” should ensure that such learning is accredited and also articulates
to further, formal qualifications. The “new education approach” should also incorporate a solution to the “limited connection with higher purpose”. Education programs would need to find ways to adapt curriculums to stimulate “contextual awareness” amongst learners and employees. The literature survey supports the introduction of an “evolving construct of a new education system”. By implication the very thought construct of the education system needs redesign to incorporate the requirements of amongst others, “credit bearing workplace learning.” The essence of such a system would require a flexible system to document learning. “Planning would need to be the basis for action”. Based on the results from the 169 participants in the research project, participants indicated that they are willing to align job descriptions to business objectives and educational standards. A “Corporate Qualifications Framework” can be developed whereby industry can quantify and manage human capital as above, for purpose of performance management, staff learning and objectives. The objective behind the development of the “Corporative Qualification Framework” is to create a simplistic system that can quantify competency for work as well as qualification purposes.

Theme 4: the role of awareness and contextual understanding
The research suggests that modern day training should aim at providing skills to individuals on a “contextual basis”. Learners often obtain the ability to perform tasks very well, without truly understanding the importance or the real need for such tasks. The “non-contextual” dilemmas discussed above could be related to the “limited awareness” challenge as indicated by participants. Limited awareness suggests that, amongst other, employees lack self-understanding of “purpose”. The net effect of “limited awareness” or “contextual understanding” can therefore be that an individual does not see the task as important and does not feel appreciated and is subsequently not inspired to perform in his or her job role. The pursuit of “purpose” per says ought to be a component in the design of all human development activity. The “evolving education approach” could assist in developing a system that recognises the importance of the consciousness level of the individual in what they do. Sustainable, responsible education and mindfulness about the job role could enhance motivation and thus “performance”. The literature survey further suggests that “awareness” or “consciousness” becomes part of the learning agenda.

The study shows that key performance areas should therefore not just focus on the task at hand. If job descriptions are developed to measure contextual awareness and consciousness, “alignment to educational standards” should be considered. Maggelan Research (2010) states that, a lot of energy goes into treating underperforming employees, while neglecting the health of the organization as a whole. The introduction of a “CQF” could in itself contribute to organisational wellness in the sense that an employee can measure their own “educational development pathway”.

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Summary of findings

During the research study, the following aspects were addressed:

1. The role of an organizational strategic plan in determining the required human capital for an organisation.
2. The relevance of industry experience, competence and non-formal training as compared to formal education and training standards.
3. The potential use of non-formal learning as credits in formal learning programs.
4. The relevance of an integrated human capital management framework and potential Corporate Qualifications Framework for South African organisations.
5. The development of contextual awareness in understanding learner development.
6. The role of skills and productivity in human capital management.
7. The identification of skills GAPs and the management thereof to the benefit of the organization.

XV. PROPOSED FURTHER RESEARCH

The research highlighted the need for further investigation into the following:

i. The practical application of a CQF in industry with specific reference to developing automated systems and software.
ii. Determining Return on Investment (ROI) on the investment of workplace education versus productivity.
iii. Effectiveness of workplace learning versus formal learning.
iv. The real recognition of South African qualifications in the global arena, reciprocity and international employment prospects.
vi. The real impact of a lack of contextual awareness on the poverty mindset.
vii. Possible cost implications of using non-formal learning as formal learning credits.
viii. Possible development of a South African system where workplace learning could enjoy formal recognition.

XVI. CONCLUSION

The integration of the research objectives suggests the use of a framework where business objectives are used as the guidelines to design competence objectives. Clustered together, this competence set constitutes a job description, a benchmark from which industry experience and also learning objectives can be deduced. Thus, to measure against this benchmark could enable performance management and the formalizing of learning objectives (Houron, 2008). In essence this approach suggests a framework where education, learning and workplace performance are measured all in one (Lategan, 2001).

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