International Conference on Applied Psychology and Human Behavior

PROCEEDINGS

July 9-12, 2018
Madeira-Portugal
Organized by

Madeira Interactive Technologies Institute

Universidade da Madeira

Institute of Knowledge and Development
General Information

Official Language

The official language of the conference is English. All presentations, including discussions and submissions, must be made in the official language. No translation will be provided.

Proceedings

Each accepted paper reaching the secretariat in time will be published in the proceedings.

Opening Hours of the Registration Desk

July 9, Monday: 08:00 – 10:00
July 10, Monday: 08:00 – 10:00
July 11, Tuesday: 8:00 – 17:30
July 12, Wednesday: 8:00 – 14:00

Presentation

Presentations can be done using a data projector. All authors are kindly asked to take their presentations in a flashdrive. All conference rooms are supplied with data projector, PC and internet.

Smoking

Please, be so kind to your lungs and your colleagues by not smoking during the sessions and social events.
WELCOME MESSAGE FROM THE CHAIRMANS

On behalf of the Institute of Knowledge and Development, it is our pleasure to welcome you to the International Conference on Applied Psychology 2018 (ICAP18) in Funchal (Portugal).

Psychology is a science crossing several work fields and the contribute of human behavior study is becoming more and more acknowledged and considered.

At ICAP we look for sharing experiences and reflect about different applications of Psychology and the communication with non-psychology professionals.

With this conference we expect to contribute to foster new work interfaces between Psychology and other sciences.

The Organization would like to acknowledge the efforts of all the people and agents which have collaborated in the event.

The Chairmans:

Dora Pereira, University of Madeira and Research Centre for Regional and Local Studies (CIERL)
Morgado-Dias, University of Madeira and Madeira Interactive Technology Institute
Committees

GENERAL CHAIRS
Antonio Ravelo, University of Las Palmas de Gran Canaria
Carlos Travieso, University of Las Palmas de Gran Canaria
Jesus Alonso, University of Las Palmas de Gran Canaria
Morgado Dias, University of Madeira and Madeira Interactive Technology Institute

SCIENTIFIC PROGRAM COMMITTEE
Ana Teixeira de Melo, Centre for Social Studies, University of Coimbra
Ana Almeida, Faculdade de Psicologia e de Ciências da Educação – UC
Ana Galhardo, Instituto Superior Miguel Torga
Ana Soares, School of Psychology, University of Minho
Ana Sani, UFP
Ana Fonseca, University of Coimbra
Angela Maia, University of Minho
Antonio Moreira, University of Aveiro
António Fonseca, Universidade Católica Portuguesa
António Nunes, Universidade da Beira Interior – NECE (Núcleo de Estudos em Ciências Empresariais)
António Moreira, Universidade Aberta
Carl Martin Allwood, University of Gothenburg
Catarina Oliveira, University of Aveiro
Celia Sales, Center for Psychology at the University of Porto (CPUP)
Célia Ribeiro, Departamento de Economia, Gestão e Ciências Sociais da Universidade Católica Portuguesa – Centro Regional das Beiras
Cristina Nunes, University of Algarve
Cristina Martins, University of Minho
Cristina Pereira, Instituto Politécnico de Castelos Branco
Cristina Queiros, University of Porto
Daniel R. Marques, University of Aveiro
Delfina Gabriela Garrido Ramos, Instituto Politécnico de Cávado e do Ave
Dora Pereira, Universidade da Madeira
Edilene Guimarães, Universidade do Minho – Portugal / Instituto Federal de Pernambuco – Brasil
Felismina Mendes, Universidade de Évora
Félix Neto, University of Porto
Guida Veiga, Universidade de Évora
Henrique Vicente, University of Évora
Isabel Silva, Universidade do Minho. Escola de Psicologia
Isabel Varregoso, ESECS: Instituto Politécnico de Leiria | CIQV – Centro de Investigação em Qualidade IPL/IPSida
Isabel Janeiro, faculdade de psicologia
J. António Moreira, Departamento de Educação e Ensino a Distância/ Universidade Aberta
Joana Sequeira, Instituto Superior Miguel Torga
João Nogueira, NOVA FCSH
João Pereira, Fundação Romão de Sousa
João Maroco, ISPA-IU
Jorge Gonçalves, IFILNOVA – New University of Lisbon
Jose Pais Ribeiro, University of Porto
José Pedro Cerdeira, Escola Superior Educação – Politécnico de Coimbra
Joseph Conboy, UIDEF Instituto de Educação
Liliana Sousa, University of Aveiro
Luiza Nobre-Lima, Faculdade de Psicologia e de Ciências da Educação, Universidade Coimbra
Madalena Melo, Department of Psychology – University of Evora
Madalena Pereira, University of Beira Interior
Maria Elsa Chaleta, Universidade de Évora
Marisa Matias, FPCEUP
Marlene Brito, University of Aveiro
Marreiros Cristina, Universidade de Evora
Morgado Dias, Centro de Competências de Ciências Exactas e Engenharias, Universidade da Madeira
Rita Francisco, Universidade Católica Portuguesa, Faculdade de Ciências Humanas

LOCAL ORGANIZING COMMITTEE
Morgado Dias, University of Madeira and Madeira Interactive Technology Institute
Filipe Quintal, University of Madeira and Madeira Interactive Technology Institute
Herlander Mata-Lima, Universidade Federal da Integração Latino-Americana
Lucas Pereira, University of Madeira and Madeira Interactive Technology Institute
Mary Barreto, University of Madeira and Madeira Interactive Technology Institute
Tiago Meireles, University of Madeira and Madeira Interactive Technology Institute
Dario Baptista, Madeira Interactive Technology Institute
Fábio Mendonça, Madeira Interactive Technology Institute
Luis Rodolfo Sousa, University of Madeira and Madeira Interactive Technology Institute
Roham Torabi, Madeira Interactive Technology Institute
Sandy Rodrigues, Madeira Interactive Technology Institute
Sheikh Mostafa, Madeira Interactive Technology Institute

UMa: University of Madeira
M-ITI: Madeira Interactive Technologies Institute
UNILA: Universidade Federal da Integração Latino-Americana
Keynote Abstracts

Prof. D. Rafael Luís

Rafael Luís received the PhD degree in Mathematical Analysis at University of Madeira in 2011. He has been study both autonomous and nonautonomous (periodic) discrete dynamical systems applied in population dynamics and economics. He is teacher of Mathematics at University of Madeira and researcher at Center for Mathematical Analysis, Geometry and Dynamical Systems, Instituto Superior Técnico, University of Lisbon, Portugal.

Title: Paraconsistent Annotated Logic Programs and its Application to Intelligent Control/Safety Verification

Abstract

Nowadays a lot of data are treated automatically in various artificial intelligent systems by using computers though, those data include various kinds of contradiction and inconsistency and usual computer logics are not so good at dealing with contradiction in the same system. Paraconsistent annotated logic is well known as a formal logic that can deal with contradiction in the framework of consistent logical systems. One of its logic programs called Extended Vector Annotated Logic Program with Strong Negation (EVALPSN) has been developed for dealing with non-monotonic reasoning such as defeasible reasoning, etc. by Kazumi Nakamatsu and applied to conflict resolving, various intelligent control systems such as traffic signal control, railway interlocking safety verification, etc. One of these applications of EVALPSN, traffic signal control at an intersection will be introduced with visual simulation. Moreover, a special EVALPSN that can deal with a sort of temporal reasoning, before-after relations between processes (time intervals), which has been developed and named Bf(before-after)–EVALPSN by Kazumi Nakamatsu, and its application to real-time process order control will be introduced based on a small pipeline processing example.

Prof. Dr. Sc. Kazumi Nakamatsu

Kazumi Nakamatsu received the Ms. Eng. and Dr. Sci. from Shizuoka University, and Kyushu University, Japan, respectively. He is a full Professor at School of Human Science and Environment, University of Hyogo, Japan since 2005. His research interests encompass various kinds of logic and their applications to Computer Science, especially paraconsistent annotated logic programs and their applications. He has developed some paraconsistent annotated logic programs called ALPSN(Annotated Logic Program with Strong Negation), VALPSN(Vector ALPSN), EVALPSN(Extended VALPSN) and bf-EVALPSN (before-after EVALPSN) recently, and applied them to various intelligent systems such as a safety verification based railway interlocking control system and process order control. He is an author of over 150
journal papers, book chapters and conference papers, and edited 12 books published by prominent publishers such as Springer-Verlag. He has chaired various international conferences, workshops and invited sessions, and he has been a member of numerous international program committees of workshops and conferences in the area of Artificial Intelligence and Computer Science. He serves as Editor-in-Chief of the International Journal of Reasoning-based Intelligent Systems by Inderscience Publishers (UK), and as an Associate Editor of the Journal of Intelligent Technologies by IOS Press, International Journal of Hybrid Intelligence by Inderscience Publishers (UK), and Vietnamese Journal of Computer Science by Springer-Verlag. He also serves as an editorial board member of many international journals. He has contributed numerous invited talks at international workshops, conferences, and academic organizations such as universities. He also is a recipient of some conference and paper awards. He is a member of Japan AI Society, etc.

Title: Brain Computer Interfaces and Immersive Virtual Reality for Post Stroke Motor Rehabilitation

Abstract

Stroke is one of the most common causes of acquired disability, leaving numerous adults with cognitive and motor impairments, and affecting patients’ capability to live independently. In recent years, novel rehabilitation paradigms have been proposed to address the life-long plasticity of the brain to regain motor function. Among them, the use of a hybrid brain–computer interface (BCI)—virtual reality (VR) approach can combine a personalized motor training in a VR environment, exploiting brain mechanisms for action execution and observation, and a neuro-feedback paradigm using mental imagery as a way to engage secondary or indirect pathways to access undamaged cortico-spinal tracts. I will present the development and validation experiments of the proposed technology. More specifically, I will discuss the underlying neuroscientific principles, use of low cost EEG acquisition systems, the integration in immersive VR and the use of haptic technology. I will show how the proposed motor imagery driven BCI-VR system is usable, engaging and able to engage the desired brain motor areas. This novel technology enables stroke survivors without active movement to engage in more effective rehabilitation paradigms.

Professor Ari Aharari

Ari Aharari received M.E. and PhD in Industrial Science and Technology Engineering and Robotics from Niigata University and Kyushu Institute of Technology, Japan in 2004 and 2007, respectively.
In 2004, he joined GMD-JAPAN as a Research Assistant. He was Research Scientist and Coordinator at FAIS-Robotics Development Support Office from 2004 to 2007. He was a Postdoctoral Research Fellow of the Japan Society for the Promotion of Science (JSPS) at Waseda University, Japan from 2007 to 2008. He served as a Senior Researcher of Fukoka IST involved in the Japan Cluster Project from 2008 to 2010. In 2010, he became an Assistant Professor at the faculty of Informatics of Nagasaki Institute of Applied Science.
Since 2012, he has been Associate Professor at the department of Computer and Information Science, Sojo University, Japan. He has served as a main researcher and Principal Investigator in more than 25 projects and is working closely with more than 50 Japanese companies, Local government laboratories and Universities. His research interests are IoT, Robotics, IT Agriculture, Image Processing and Data Analysis (Big Data) and their applications. He is a member of IEEE (Robotics and Automation Society), RSJ (Robotics Society of Japan), IEICE (Institute of Electronics, Information and Communication Engineers), IIEEJ (Institute of Image Electronics Engineers of Japan).

**Title: Advanced Mathematics for Designing IoT System**

**Abstract**

The Internet of Things may be a hot topic in the society but it’s not a new concept especially in industry. In this talk, we introduce the fundamental concepts of Internet of Things (IoT) and critical points about how we can design an IoT system. In follow, we introduce Society 5.0 and Industry 4.0 and explain about two projects which was designed based on advanced mathematics for IoT systems.

**Professor Vasile Berinde**

Vasile Berinde is a Full Professor and Head of Department in the Department of Mathematics and Computer Science at Technical University of Cluj-Napoca, North University Centre at Baia Mare (Romania). His research interests include nonlinear analysis, iterative methods for solving nonlinear functional equations and numerical analysis, research areas in which he has published a significant number of papers in prestigious scientific journals with a high impact and visibility. He has been included in the 2016 and 2017 list of Web of Science Highly Cited Researchers and has been elected as a Honorary Doctor of National Technical University Donetsk, Ukraine. He is Vice-President of Romanian Mathematical Society and has been invited as keynote, plenary or invited speaker to many international conferences in different countries and continents.

**Title: Pompeiu-Hausdorff metric and its wide spreading role in science and technology**

**Abstract**

The distance between two sets has been introduced at the beginning of the XXth century by the successive contribution of D. Pompeiu (1873-1954), M. Frechet (1878-1973) and F. Hausdorff (1878-1942). The importance of this fundamental concept came rather late in mathematics (about 1940) and even later in applied sciences and technology but nowadays it is widely used in almost all research areas. The list of applications of what is generally known as Hausdorff metric and less often as Pompeiu-Hausdorff metric is really impressive and comprises more than 100 Web of Science Categories of research areas, of which we mention: radiology nuclear medicine medical imaging, medicine research experimental, clinical neurology, imaging science photographic technology, transportation science technology, engineering biomedical, automation control systems, remote sensing, green sustainable science technology, transportation science technology, environmental sciences, engineering
ocean etc. The main aim of this talk is to give a brief account on the role of Pompeiu-Hausdorff metric and its ubiquity in applied sciences and technology by means of some sample applications.
# Table of papers

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personalizing paper-and-pencil training for cognitive rehabilitation: a feasibility study with a web-based Task Generator</td>
<td>1</td>
</tr>
<tr>
<td>Lúcia Faria A., Bermúdez i Badia S.</td>
<td></td>
</tr>
<tr>
<td>Using a continuous improvement tool to improve workers' well-being and productivity - A case study in a piglet cutting workstation</td>
<td>7</td>
</tr>
<tr>
<td>Brito M., Luísa Ramos A., Carneiro P., Antónia Gonçalves M., Teresa Pereira M., Pinto V.</td>
<td></td>
</tr>
<tr>
<td>Compassion fatigue and satisfaction for compassion: threats to the quality of life in portuguese veterinaries.</td>
<td>12</td>
</tr>
<tr>
<td>Lobo F.</td>
<td></td>
</tr>
<tr>
<td>A framework for stakeholder engagement for developing sustainable behaviour research: a Lake Victoria case study.</td>
<td>22</td>
</tr>
<tr>
<td>Van den Broek K.</td>
<td></td>
</tr>
<tr>
<td>Welcome Onboard this Fight.</td>
<td>27</td>
</tr>
<tr>
<td>Maria Vieira A., Maria Vieira A.</td>
<td></td>
</tr>
<tr>
<td>Education and attachment: dropping out school failure</td>
<td>32</td>
</tr>
<tr>
<td>Castro R., Isabel Pereira D.</td>
<td></td>
</tr>
<tr>
<td>Collaborative Learning: Leaders' Selection Method and Team Performance</td>
<td>38</td>
</tr>
<tr>
<td>Pacheco D., Soares L.</td>
<td></td>
</tr>
<tr>
<td>Evolution of Cultural Intelligence in Students Working in Multi-national Teams: A Case-Study</td>
<td>42</td>
</tr>
<tr>
<td>Pacheco D., Stevens S.</td>
<td></td>
</tr>
</tbody>
</table>
Personalizing paper-and-pencil training for cognitive rehabilitation: a feasibility study with a web-based Task Generator

Ana Lúcia Faria
Madeira Interactive Technologies Institute
Faculdade de Psicologia e de Ciências da Educação
Universidade de Coimbra
Coimbra, Portugal
ana.faria@m-iti.org

Sergi Bermúdez i Badia
Madeira Interactive Technologies Institute
Centro de Ciências Exatas e de Engenharia
Universidade da Madeira
Funchal, Portugal
sergi.bermudez@m-iti.org

Abstract—Cognitive impairments impose important limitations in the performance of activities of daily living. Although there is important evidence on cognitive rehabilitation benefits, its implementation is limited due to the demands in terms of time and human resources. Moreover, many cognitive rehabilitation interventions lack a solid theoretical framework in the selection of paper-and-pencil tasks by the clinicians. In this endeavor, it would be useful to have a tool that could generate standardized paper-and-pencil tasks, customized according to patients’ needs. Combining the advantages of information and communication technologies (ICT’s) with a participatory design approach involving 20 health professionals, a novel web-tool for the generation of cognitive rehabilitation training was developed: the Task Generator (TG). The TG is a web-based tool that systematically addresses multiple cognitive domains, and easily generates highly personalized paper-and-pencil training tasks. A clinical evaluation of the TG with twenty stroke patients showed that, by enabling the adaptation of task parameters and difficulty levels according to patient cognitive assessment, this tool provides a comprehensive cognitive training.

Keywords—Cognitive Rehabilitation; Personalization; Stroke; Technology Barriers.

I. INTRODUCTION

Cognitive impairments following stroke are common and are present in approximately 70% of patients in the acute stages of recovery [1], causing problems in activities of daily life and social participation. These cognitive impairments commonly include focal disorders, such as aphasia and neglect, as well as more diffuse abnormalities, such as slowed information processing and executive dysfunction [2]. Cognitive rehabilitation is the treatment of choice for these deficits and can be defined as a therapy designed to restore, substitute or compensate for lost cognitive abilities due to injury or illness. Additionally, it targets the improvement of skills by reestablishing or strengthening abilities that were intact prior to the loss [3].

Cognitive training has been proven to be successful in improving cognitive deficits after stroke [4][5], but its efficacy highly depends on the intensity of treatment over an extended period of time. However, the implementation of cognitive training programs with the appropriate intensity and duration becomes difficult because of important limitations. First, the traditional intervention model requires multidisciplinary teams to manage exercises based on patients’ profile and performance [6]. The cost of this process limits the intensity and length of the treatments, compromising its sustainability, accessibility and scalability, resulting in a large economic burden to both health systems and families [7]. Besides, the patient needs to travel to the rehabilitation center, making the duration of the treatment conditional to the patient’s availability. Second, since patients usually need to travel to clinical facilities to receive rehabilitation, interventions are subject to the availability of vacancies and transportation [8]. Third and last, in the neuropsychological rehabilitation field there is an absence of clinical practice guidelines to allow a rational extension of these services. For instance, classic cognitive training mainly involve solving paper-and-pencil tasks under specialized supervision because they are clinically validated and have a reduced cost [9]. Unfortunately, these tasks selection and adjustment to the patient’s needs generally lack a solid theoretical framework [10].

The American Congress of Rehabilitation Medicine (ACRM) conducted systematic reviews on a total of 370 studies about cognitive rehabilitation for people with TBI or stroke, published from 1971 through 2008 [11],[4],[5]. Cognitive rehabilitation was shown to be of greater benefit than conventional rehabilitation in 94.1% of the comparisons studies. According to this evidence, there is a clear indication that cognitive rehabilitation is the best available form of treatment for people who exhibit cognitive impairments and functional limitations after TBI or stroke [5]. However, Paiva and colleagues performed a meta-analysis on cognitive rehabilitation in stroke and the results suggested a lack of sufficient evidence to support or refute the efficacy of cognitive interventions in stroke patients [12]. These divergent results should be interpreted with caution since in this meta-analysis 504 of 507 studies were excluded due to its low quality, only 3 were considered by the authors. Additional research, using standardized assessment instruments and well-structured
training programs, is needed to elucidate the mechanisms of change underlying the efficacy of cognitive rehabilitation.

An international group of researchers and clinicians (known as INCOG) recommends that cognitive assessment and rehabilitation should be tailored to the patient neuropsychological profile, premorbid cognitive characteristics and goals for life activities and participation [13]. The existing cognitive rehabilitation theories and models have been relatively successful when applied to focal cortical deficits (e.g. neglect and aphasia), but almost inexistent for more generalized cognitive impairment (e.g. slowed information processing and executive dysfunction) [14]. It is more challenging when we are addressing multiple aspects of cognition simultaneously. Hence, it is difficult to provide clear guidelines on how to parameterize cognitive training tasks and how to adapt them to the specific needs of each patient [15]. Currently, cognitive rehabilitation is mostly planned and delivered based on a selection of a limited set of paper-and-pencil cognitive tasks. Consequently, most cognitive training tasks may not be properly adjusted to the specific needs of each patient [9]. Further, task selection is also heavily grounded on the experience of the clinician - a type of knowledge that is difficult to objectively capture - therefore making it difficult to transmit and share [15].

Information and Communication Technologies (ICT’s) - based solutions such as serious games, Virtual Reality (VR) simulations or other computer mediated approaches, have an enormous potential for enhancing the intensity and personalization of cognitive rehabilitation by supporting the ability to carry out controlled, highly adaptive and ecologically valid tasks [16]. Over the past few years, several computer based solutions have been proposed to increase the availability and quality of cognitive training, flooding the marketplace with commercial brain exercise programs that claim to improve cognition and have diagnostic abilities [17] such as the CogWeb [18] and the Guttmann Neuro Personal Trainer [19], for instance.

VR offers the possibility to simulate daily tasks in a virtual environment, adapting the task parameters according to the patient performance, which increases training specificity and patient’s motivation by avoiding boredom and frustration in a more sophisticated and ecologically valid approach [20]. Nevertheless, the clear enthusiasm for the use of technology in rehabilitation must be tempered by an acknowledgement of potential barriers, such its inherent costs, accessibility and usability by patients and healthcare professionals. Most virtual environments used in clinical studies are not commercially available and only a few research laboratories have access to them. Despite the proliferation of ICT’s in cognitive rehabilitation, only 5-15% of people with disabilities have access to technological devices that can assist in the rehabilitation process [21]. Additionally, many healthcare providers are unfamiliar with VR technology, only about 27% of these professionals refer to use these computer assisted technologies in their rehabilitation interventions [22]. Also, technological interventions are subject to continuous maintenance and technical support, eventually resulting in delayed interventions or the need to reschedule. Such complications speak to the challenges of implementing interventions dependent upon technology within inpatient and outpatient rehabilitation settings. Any delays in these fast paced settings, requiring the coordination of various professionals, can be disruptive [23].

In order to increase the benefits of ICT’s and to address its limitations, a web-based tool - the Task Generator (TG) – was developed through a participatory design approach with 20 rehabilitation professionals [24]. Besides integrating existing theories and models [10], it capitalizes on the solid aspects of existing computerized training protocols for cognitive rehabilitation [8], [18], [25]. The TG addresses multiple domains of cognitive functioning in a systematic and quantitative manner, generating a profile of cognitive demands for each task and enabling the clinician to easily deliver a highly adapted training program to each patient’s deficits. Given that the TG ultimately generates paper-and-pencil training tasks, its application is compatible with the current practice and existing limitations of clinical settings.

This paper presents the main characteristics of the developed system and the results of a feasibility study with stroke patients. To evaluate the personalization of the TG tasks, we designed a study with the objective of answering two main questions: 1) Does TG personalization properly adapt to patient’s needs? and 2) How accurate is the generated profile of cognitive demands of each task?

II. MATERIALS AND METHODS

A. Task Generator

The TG is a free and worldwide accessible tool (neurorehabilitation.m-iti.org/TaskGenerator), able to generate personalized paper-and-pencil cognitive rehabilitation programs in PDF format, composed by a set of 11 tasks (Table 1) gathered from clinical settings and parameterized through rehabilitation experts input.

| TABLE I. LIST OF TRAINING TASKS AND THEIR OBJECTIVES. |
|----------------|----------------|
| **Tasks**      | **Objectives** |
| Cancellation   | Find a target stimulus in a pool of distractors. |
| Numeric Sequences | A numeric sequence is given and the subject has to come up with the missing numbers. |
| Problem Resolution | Two types of problems are presented, numeric calculations or calculations based on textual descriptions of daily activities. |
| Association     | A number of randomized pairs of items need to be paired correctly. |
| Comprehension of Contexts | Some images are given with a number of descriptions. Correct descriptions need to be identified. |
| Image Pairs     | A number of pairs of images to be memorized is presented and have to be recalled after 30 minutes. |
| Word Search     | A number of words can be found up, down, forward, or diagonally in a pool of randomized letters. |
| Mazes           | Finding the way out of a labyrinth. |
| Categorization  | Grouping items into their underlying categories. The categories have to be guessed from the items. |
| Action Sequencing | A list of randomized steps needed for the execution of several activities of daily living is presented. |
| Memory of Stories | Recalling information about a read story or a picture by answering questions about it. |
In short, 11 standard tasks have been operationalized according to how their different parameters impact different cognitive domains (Attention, Memory, Executive Functions, Language). This was achieved by means of a participatory design methodology involving 20 rehabilitation experts who rated multiple variations of the task parameters in terms of its cognitive demands [24].

1) Individual Task Parameterization

The TG is able to procedurally generate each of the 11 tasks individually by directly specifying the values of their parameters (Fig. 1). Every time a task is generated by the TG is different, even if sharing the exact same parameters. This allows for the repeated use of the tool, thus avoiding repetitiveness while making sure that the intrinsic parameters of each task are adjusted to the clinicians’ specifications.

2) Task Profile

All the generated tasks have a graphical representation of the profile of their cognitive demands (Memory, Attention, Executive Functions and Language) and overall Difficulty, enabling clinicians to intuitively visualize and interpret the generated training, being thus able to adapt it to each patient’s needs (Fig. 2).

3) Full Cognitive Training Program Generation

Once a patient is assessed and the patient’s deficits and general cognitive profile is known, the challenge of the clinician is how to select the best set of parameters for each specific patient. TG solves that problem by allowing clinicians to easily generate a complete cognitive training program containing the whole set of the 11 tasks by simply specifying the cognitive profile for a patient in 4 cognitive domains (Memory, Attention, Executive Functions, Language) and the overall task difficulty in a 1 to 10 scale (Fig. 3). This can be easily done through the characterization of the patient with validated instruments such as the MoCA [26]. After the characterization of a profile, a full training program is generated by pressing the “Generate Training” button and then downloaded as a pdf file by pressing the “Download PDF” button.

4) Training adaptation over time

When the patient finishes a set of 11 tasks, the clinician may use one of these 2 procedures:

1) From training session to training session - By scoring the task performance using a 0 – 100% scale, and computing the mean performance of the 11 tasks set. If the mean performance is greater than a specific threshold (for instance assuming an optimal performance above the 70% [27]), the clinician should increase in 0.5 the difficulty parameter, while keeping the ones related to Memory, Attention, Executive Functions and Language constant.

2) After a progress evaluation point - Performing a new assessment of the patient profile and generating in a systematic and objective manner a new set of training tasks following the same procedure stated in the Cognitive Training Program Generation section.

Fig. 1. Parameterization example of the Number Sequencing task, where task parameters can be manually selected.

Fig. 2: Example of the Cancellation task with different parameter selection. The graphical profile changes according to the parameters defined by the clinician: a) Attention 2.5, Memory 3, Executive Functions 2.5, Language 3 and Difficulty 3.5; b) Attention 4.5, Memory 6, Executive Functions 7, Language 8 and Difficulty 7.5; c) Attention 9, Memory 6.5, Executive Functions 8.5, Language 5 and Difficulty 8.
B. Clinical evaluation

1) Participants

Participants were recruited at the Nélio Mendonça, João Almada and Santo Antônio Rehabilitation Units (Madeira Health Service, Portugal), based on the following inclusion criteria: no vision deficits; capacity to be seated; non-aphasic and with sufficient cognitive ability to understand the task instructions (as subjectively assessed by the clinicians). The sample consisted of twenty (10 female, 10 male) middle-aged (M= 61.75 years old; SD= 8.89) stroke patients (9 right hemisphere and 11 left hemisphere lesion), with a mean of 4.05 ± 3.73 months post-stroke, and with a mean schooling of 4.95 ± 4.03 years. The Madeira Health Service Ethical Committee approved the study and all the participants gave previous informed consent.

2) Characterization of patients’ cognitive profile and training personalization

The cognitive profile of each participant was assessed with the Montreal Cognitive Assessment (MoCA) [26], a cognitive screening instrument that, besides a high sensitivity to post-stroke deficits [28], includes a reduced version of the Trail Making Test - version B [29], a representative measure of the executive functions domain. The TG Attention parameter was defined from MoCA’s attention component score (0-6). The delayed recall and orientation scores (0-11) were used to parameterize Memory. Executive Functions were parameterized through the sum of the visuospatial, executive and abstraction MoCA sub-scores (0-7). Finally, MoCA’s naming and the language scores (0-6) were used to parameterize Language. The MoCA total score (0-30) was used to parameterize the overall Difficulty of the TG training. All TG parameters were normalized on a scale 1-10 and a personalized training was generated for each participant, and printed on paper. Participants completed the generated tasks in two sessions of 30 to 45 minutes with the assistance of a psychologist.

3) Data analysis

The Statistical Package for the Social Sciences v.20 was used for the data analysis. Missing data were replaced through the single regression method. The normality of the distribution was assessed using the Kolmogorov-Smirnov test and, because most distributions deviated from normality, non-parametric correlations (Spearman rho) were performed.

In order to analyze task performance in each cognitive domain, we applied the following formula:

\[
\text{Domain Performance} = \frac{\sum (\text{Task performance} \times \text{Task Domain demands})}{10}
\]

where Domain Performance is a metric that measures in percentage the contribution of each cognitive domain (Memory, Attention, Executive Functions, Language) taking into account the cognitive demands of each generated Task. This approach allows us to correct task performance for the amount of challenge posed. That is, 100% task performance on a task that has 5 points (out of 10) Memory demands results on a 50% Memory performance, and so on and so forth.

III. RESULTS

According to the Kolmogorov-Smirnov (KS) test, data were normally distributed for age (KS=.147, p=.200) but not for gender (KS=.335, p<.001), years of schooling (KS=.293, p<.001), stroke location (KS=.361, p<.001) and time post-stroke (KS=.261, p=.001). Data were normally distributed concerning the cognitive assessment with the MoCA (KS=.149, p=.200) and the performance in the TG (KS=.236, p=.005).

A. Does the TG personalization adapt to the patients’ needs?

When comparing the patients’ overall performance in MoCA and that in the adapted TG tasks, we observe that patients showed higher performances that those of their cognitive assessment (Z=−3.808, p<.001) (Fig. 4). This indicates that patients with lower MoCA scores were presented with easier tasks, thus scoring higher. Consistent with this finding, we found a moderate correlation (r=.520, p=.019) between performance in the TG training (Mdn=83.25, IQR=67.88-91.5) and cognitive functioning as assessed by MoCA (Mdn=18, IQR=16-21.75, strongly suggesting that TG task performance is not only determined by the skillset of the patient. Hence, these data are consistent with the notion of a successful adaptation of the TG training parameters based on the cognitive characterization of each patient, increasing the average task performance and dissociating it from the cognitive skillset of the patient.

In addition, our data shows that more difficult tasks were automatically assigned to the participants performing at a higher level. That is, regardless of the task adaptation procedures, a very strong correlation (r=.872, p<.001) was found between the average TG task performance (Mdn=83.25, IQR=67.88-91.5) and the difficulty setting assigned to those patients by the TG (Mdn=4.83, IQR=3.24-6.43). This finding suggests that the personalization of the challenge of each task was properly adapted to the capabilities of each patient.

![Fig. 4. Comparison of MoCA assessment vs. TG performance scores. MoCA scores were converted to a 0-100 scale to allow comparison.](image-url)
B. How accurate is the generated profile of cognitive demands of each task?

To address this question, we considered the Domain Performance metric - task performance weighed by their demand in each cognitive domain – as described in the Data Analysis section. This allows us to consider both task performance and personalization in a single metric. That is, a 100% performance in a task of difficulty 5 is equivalent to a 50% performance on a task of difficulty 10.

A strong correlation ($r_s=.868$, $p<.001$) was found between the performance in attention (Mdn=5.25, IQR=3.55-6.19) and the MoCA attention score (Mdn=3, IQR=3.4-7.5). Between the performance in memory (Mdn=3.97, IQR=293-5.23) and the MoCA memory score (Mdn=8, IQR=6-8.75) the correlation was also strong ($r_s=.730$, $p<.001$). The performance in the executive functions (Mdn=4.91, IQR=3.74-5.8) was also strongly correlated ($r_s=.742$, $p<.001$) with the MoCA executive functions score (Mdn=4, IQR=2.25-4.75). Finally, the performance in language (Mdn=3.43, IQR=2.66-4.37) and MoCA language score (Mdn=4, IQR=2-5) was moderately correlated: $r_s=.475$, $p=.034$ (Table 2).

**TABLE II. SPEARMAN CORRELATIONS BETWEEN THE TG PERFORMANCE (WEIGHED BY THEIR DEMAND IN EACH COGNITIVE DOMAIN AND TOTAL SCORE) AND THE MOCA SUBDOMAINS SCORES.**

<table>
<thead>
<tr>
<th>Subdomain</th>
<th>MoCA Attention</th>
<th>MoCA Memory</th>
<th>MoCA Executive</th>
<th>MoCA Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>TG Attention</td>
<td>.686**</td>
<td>.662**</td>
<td>.621**</td>
<td>---</td>
</tr>
<tr>
<td>TG Memory</td>
<td>.755**</td>
<td>.730**</td>
<td>.773**</td>
<td>---</td>
</tr>
<tr>
<td>TG Executive</td>
<td>.723**</td>
<td>.721**</td>
<td>.742**</td>
<td>---</td>
</tr>
<tr>
<td>TG Language</td>
<td>.682**</td>
<td>.688**</td>
<td>.719**</td>
<td>.475**</td>
</tr>
<tr>
<td>TG Total</td>
<td>.492*</td>
<td>.507*</td>
<td>.460*</td>
<td>---</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level. * Correlation is significant at the 0.05 level.**

C. Reliability of the training

The internal consistency of the TG training was assessed through the Cronbach’s alpha, using the median performance of each task. The TG revealed and acceptable internal consistency ($\alpha=.786$) which means that, despite the great diversity in the type of training tasks, the consistency in its performance is acceptable. By performing this reliability analysis removing the Image Pairs task, a greater internal consistency level ($\alpha=.818$, which is good) is obtained.

IV. DISCUSSION

In this paper we presented a feasibility study with the TG, a web-based tool that was developed through the combination of guidelines from a participatory design approach with 20 rehabilitation professionals, ICT’s and existing rehabilitation models and theories. The TG enables the parameterization and generation of personalized cognitive paper-and-pencil training tasks. A clinical study with stroke patients has led us to four main conclusions concerning the feasibility of this web-based tool.

First, we can determine that, although moderately correlated, the TG training performance is higher and statistically different from the patients general cognitive functioning, as assessed by the MoCA. This finding leads us to conclude that performance is modulated by the TG adaptation. Second, our results demonstrate that more difficult tasks were assigned to the patients that could perform at higher levels. This finding indicates that our personalization adapts properly to each patient’s skillset, providing an adaptive challenge level. Finally, we found moderate and strong correlations between attention, memory, executive functions and language assessment scores with the TG performance in the corresponding domains. These results largely support the existing task profiling, that is, the methodology used to quantify how each task impacts demands on each domain. Consequently, since our Domain Performance is correlated with the scores of all MoCA subdomains, this suggests that it may be possible to rely on actual TG task performance to provide an iterative TG training adaptation without requiring repeated clinical assessments.

Finally, the TG was very well received by patients and rehabilitation professionals, who showed interest and motivation to use it in the future.

V. CONCLUSIONS

We believe that the TG contributes towards the definition of objective procedures for the application of adaptive cognitive rehabilitation through the use of ICT’s. The use of TG has virtually zero cost associated and can be widely deployed at healthcare centers. This new approach does not interfere with current clinical practices. By enabling the adaptation of task parameters and difficulty levels according to patient performance, this tool provides a comprehensive and highly personalized cognitive training. Given the encouraging results of this study, we are performing a longitudinal clinical trial to measure the impact of intensive cognitive training with the TG. In the meantime, the TG will continue to evolve with the development of more exercises.

ACKNOWLEDGMENT

This work was supported by the European Commission through the RehabNet project - Neuroscience Based Interactive Systems for Motor Rehabilitation - EC (303891 RehabNet FP7-PEOPLE-2011-CIG); by the ARDITI - Agência Regional para o Desenvolvimento da Investigação Tecnologia e Inovação through the project M14-20-09-5369-FSE-000001- PhD scholarship; and by the Fundação para a Ciência e Tecnologia (Portuguese Foundation for Science and Technology) through UID/EEA/50009/2013.

REFERENCES


Using a continuous improvement tool to improve workers’ well-being and productivity

A case study in a piglet cutting workstation

Marlene Brito
Research Center of Mechanical Engineering (CIDEM)
Polytechnic of Porto
Porto, Portugal
marlenebrito@ua.pt

Ana Luísa Ramos
GOVCOPP Research Centre
DEGEIT - University of Aveiro
Aveiro, Portugal

Paula Carneiro
ALGORITMI Centre
University of Minho
Braga, Portugal

Maria Antónia Gonçalves
Research Center of Mechanical Engineering (CIDEM)
Polytechnic of Porto
Porto, Portugal

M. Teresa Pereira
Research Center of Mechanical Engineering (CIDEM)
Polytechnic of Porto
Porto, Portugal

Vera Pinto
Polytechnic of Porto
Porto, Portugal

Ana Isabel Laroca
Polytechnic of Porto
Porto, Portugal

Abstract—Nowadays there is an increasing concern for well-being. However, workers continue to suffer from musculoskeletal disorders, which are one of the most widely recognized types of occupational disease. Meat cutters face higher risks of injury and musculoskeletal problems than most other occupational groups due to repetition, force, static posture, work organization, and lack of recovery time. The aim of this paper is to use a continuous improvement audit tool to analyze the current situation of a piglet cutting workstation and then identify measures to improve it, considering productivity and workers’ well-being.

Keywords—worker well-being; ergonomics; Work-Related Musculoskeletal Disorders; productivity; meat-cutting; continuous improvement

I. INTRODUCTION

These days, there is extreme pressure for businesses to be competitive in their markets of choice [1]. This seems, however, to be impacting workers’ well-being in a negative way. According to [2], a risk of injury, illness and death is associated with work. Not only are there dangers associated with traditional occupational health hazards, an example of which being physically dangerous workplaces, but work can also be a contributor to health conditions with several other origins, such as unhealthy lifestyles, psychological conditions and chronic disease. While work can have a negative impact on health, the reverse is also true. Lack of good health can lead to more frequent disability, absenteeism and low production on the part of workers, which therefore means these workers will need more access to health care resources than their healthy counterparts. Workers, employers and society pay the costs of a poor workforce. Thus, having the safest, healthiest and most productive workforce attainable makes sense from both a business and a humanitarian standpoint. [2]. One of the most widely-spread kinds of occupational disease, in Portugal and in Europe, is work-related musculoskeletal disorders (WMSD). Because of this, European research is focusing on WMSD prevention by 2020 [3]. This paper focuses on one of the occupational groups with the highest risk of injury and musculoskeletal problems: meat cutters [4]. The activities of these workers carry several WMSD risk factors, which include repetition, force, static posture, low temperature, work organization and limited recovery time [4]. [5] and [6] have demonstrated high wrist speed and strength, common WMSD risk factors, are demanded from meat cutters, whether in line work or single stations.

The aim of this paper is to use a continuous improvement audit tool to analyze the current situation of a piglet cutting workstation and then identify measures to improve it, considering productivity and workers’ well-being.

The consumption of piglet meat is very popular in Portugal, mainly in the central zone of the country where are
dozens of restaurants dedicated to serve this type of meat. This type of meat is also sold, already cooked, as a take away service, especially during festive dates along the year.

In addition to the ergonomic problems, restaurant managers are faced with the challenge of increasing productivity while not being able to extend the period of the cutting process (11:00 to 15:00 and 19:00 to 23:00), due to the fact that the meat must be cut while hot.

II. METHODS

The methodology used was the case study. According to [6], a case study should be defined “...as a research strategy, an empirical inquiry that investigates a phenomenon within its real-life context.” Following this key idea, the case study, as a research methodology, helps to understand, explore or describe a given system/problem in which several factors are simultaneously involved, in a real context.

To achieve the aim of this paper, the current situation of the piglet cutting process was analyzed by a multifunctional team, including workers. Firstly, the team used a continuous improvement tool, which was developed by the authors, and then the Rapid Upper Limb Assessment (RULA) tool was used to evaluate the ergonomic situation. In the end, improvement solutions were presented.

A. Continuous Improvement Tool

The audit tool has a checklist format with 72 evaluation questions divided into 9 sections: efficiency, continuous improvement, safety, standards, visual management, process and operations, material flow, zero defects, ergonomics and discipline. Some of the questions are described below:

- Have there been any work accidents in the last 6 months?
- Are there any workers with occupational diseases associated with tasks performed at the workstations/production area under analysis?
- Do all workers feel responsible for continuous improvement, actively and participate frequently (more than once every 6 months) in giving ideas for it?
- Are workers aware of the existence of risk and are they informed about how to protect themselves and avoid health problems (assess whether workers have been trained in safety, use of EPI’s, ergonomic postures, etc.)?
- Does the operation(s) involve a risk of accidents (e.g: work tool slippery or difficult to grasp, etc.)?
- Are there all standards documents required in the production area in place (work instructions, cleaning plan, maintenance plan, scheduling matrix, polyvalence matrix, reaction limits, 5S audits, etc.)?
- Is there any waste related to waiting times, transportation or moving?
- Does the worker adopt an essentially static posture?
- Is effort repeated continuously for at least an hour?
- Does the work plan provide breaks for rest? If so, are they long enough to allow for a fully recovery?
- Does the work plan seem too high or too low for the worker?

The questions were answered by the management together with the workers in the form of: yes, no and not applicable (NA).

B. RULA (Rapid Upper Limb Assessment) tool

The RULA as the tool used to assess the postures, movements and forces exerted by the worker while performing the job, because it is especially useful for scenarios in which work-related upper limb disorders are reported. The higher the RULA score - varies from 1 to 7, defining the action level to be taken- the higher risk associated and the greater the urgency to carry out a more detailed study and introduce modifications to the job/workstation. The scores 1 and 2 (action level 1) indicates that the posture is acceptable if it is not maintained or repeated for long periods of time. The scores 3 and 4 (action level 2) indicates that further investigation is needed. The scores 5 and 6 (action level 3) indicates that changes are required soon. The score 7 or more indicates that changes are required immediately [8].

Fig. 1 depicts the RULA score interpretation.

<table>
<thead>
<tr>
<th>Score</th>
<th>Level of MSD Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>Acceptable posture, if it is not maintained for long time</td>
</tr>
<tr>
<td>3-4</td>
<td>Further investigation is needed and changes may be required</td>
</tr>
<tr>
<td>5-6</td>
<td>Investigation and changes are required soon</td>
</tr>
<tr>
<td>6+</td>
<td>Investigation and changes are required immediately</td>
</tr>
</tbody>
</table>

Fig. 1. RULA score interpretation

III. RESULTS AND DISCUSSION

A. Current Situation Analysis

According to the audit results, the key aspects that should be enhanced were: continuous improvement, safety, visual management, process and work organization, and ergonomics.

Fig. 2 depicts these results. The blue line represents the current score, the green line represents the target and the red line represents the current average.
These results were expected, since this area has never been the target of improvement actions and there are no standards or any kind of visual management. However, the most urgent areas of improvement should be safety and ergonomics, as safety and worker well-being must be a priority during improvement actions.

Fig. 3 shows the hands of the worker during the meat cutting process. One of the safety-failure problems identified by the team was the lack of safety gloves, an individual safety protection measure that should be implemented in this type of tasks. In the image it is also possible to note the force required to perform the task as well as the awkward hand posture.

Being a very repetitive task, which requires force and a static position to perform, workers complaints due to lumbar, wrist and shoulder pain are increasing.

Furthermore, some workers suffer from occupational diseases caused by performing this work.

The next step was to assess the workers’ postures and evaluate the risk of having musculoskeletal disorders during the meat-cutting process.

B. Ergonomic Analysis

The RULA ergonomic assessment tool considers biomechanical and postural load requirements of job tasks/demands on the neck, trunk and upper extremities. A single page worksheet was used to evaluate required body posture, force, and repetition. Based on the evaluations, scores were entered for each body region in section A for the arm and wrist, and section B for the neck and trunk.

Raised shoulders, abducted upper arms, twisted wrists, static posture, repeated actions and twisted trunk were some of the issues that penalized the final score, which was 7. According to this method “investigation and changes are required immediately”.

Fig. 4 presents some of the awkward postures adopted by the worker during the meat cutting process.

At the end of this analysis, the team identified that the priority would be the implementation of measures to improve the well-being of workers by changing the cutting process or by the re-organization of the work. This conclusion matches the results of the continuous improvement tool, whose score was less positive in the ergonomics, safety and process and work organization sections.

The next step was to gather the team with the goal of finding an ergonomic and safety improvement solution and, at the same time, if possible, an increase in productivity.

C. Improvement Solutions

The solutions found by the team took into account several requirements, such as not damaging the meat and cutting it while hot.

The final appearance should be identical to Fig. 5.
Taking into account the safety of the workers, the first immediate measure proposed by the team was the use of safety gloves. After a brief anthropometric analysis the team proposed adjusting the work plan, which is currently very low and forces the worker to acquire awkward positions. Other measures given by the team were improving lighting and increasing the frequency with which the scissors are sharpened, in order to reduce the effort made by the workers during the cutting process.

Another measure proposed to improve workers’ well-being and reduce the risk of musculoskeletal disorders was the introduction of breaks during the cutting periods. However, the manager rejected this idea because it would decrease the output leading to losses in sales. Taking that, the short periods devoted to cutting and the requirement of cutting the piglet while hot into account, the optimized solution given by the team was the automation of the process. This solution would eliminate the worker’s WMSD risk, improve their well-being and productivity quintupling.

The machine design took into account an anthropometric analysis.

Fig. 6 and 7 show some details of the machine designed by the team for the meat-cutting process.

![Figure 6. Front view of the machine](image)

![Figure 7. Detail of the cutting blades](image)

The solution is still in project mode. The next step will be to produce the model for testing.

D. Final Discussion

Beyond the measures proposed by the team, continuous improvement should also be introduced in this area, by the definition of performance indicators and objectives to achieve. The definition of standards, visual management and the introduction of Kaizen meetings with all workers should be implemented in order to achieve the objective and reduce the deviations or problems occurred in this area. Audits are also important to sustain the improvements.

The evaluation tool used in this study could be used for this purpose. According to [9] an audit enables an organization to recognize the juncture that it has accomplished and develops a regular rhythm, engaging managers in predictable ways with assigned responsibilities.

After the implementation of the machine is expected a decrease in the stress of the workers and a significant improvement of their health and well-being.

IV. CONCLUSIONS

Despite the implications in terms of absenteeism due to occupational diseases caused by work, managers still do not see the ergonomics and workers’ well-being as an investment but rather as a cost.

Automation could be a key solution to improve worker well-being, by reducing or eliminating the awkward postures and effort to perform manual tasks. It is estimated that stress levels could also be reduced. However, stress measurement was not the aim of this study and it may be one of the factors to be measured in the future.

The audit tool proved to be a great way to assess the initial situation and should be used frequently to improve the process and workers’ well-being.

REFERENCES


COMPASSION FATIGUE AND COMPASSION SATISFACTION:
THREATS TO THE QUALITY OF LIFE IN PORTUGUESE VETERINARIES.

Fátima Lobo

Portuguese Catholic University &
Center for Philosophical and Humanistic Studies
flobo@braga.ucp.pt

Abstract- The main objective of this investigation is to analyze if the proximity to the suffering of the animals is a predictor of some type of mental or physical state of prolonged pain in the Portuguese veterinary doctors or if the proximity to the suffering develop empathic relation. In this sense, the effect of permanent and prolonged contact with pain is investigated and if this contact results in some kind of fatigue, social, mental and cognitive, motor or altruistic motivation, as the instruments allow it to analyze. Compassion fatigue manifests itself through the degradation of perceptual, mental and intellectual activities, productivity drops, qualitative decrease of performance, increase in number of errors, sleep deprivation, variations in interpersonal relations, decrease of motivation and, at the limit of the states depressive moods, associated with depressive mood, psychomotor slowness, pessimism, insomnia, asthenia, guilt and despair. Compassionate satisfaction occurs when the practitioner experiences joy in helping others in a situation of weakness. Professional Quality of Life Scale / ProQOL - IV (Stamm, 2010) was the instrument applied in this investigation, the sample is 1425 veterinarians. The results show that the risk factors are related mainly to food security and sanitary inspection, with the precariousness, especially in the professionals who graduated after 1997, low wages and professional instability. The protective factors are related to the capacity of aid in the health and quality of life of the animals, in the technical support to the families, in the resolution of clinical cases and in the man-animal relationship.

Keywords- Compassion Satisfaction, Compassionate Fatigue, Quality of Life, Veterinarians, Portuguese.

I. INTRODUCTION

The main objective of this investigation is to analyze if the proximity with the suffering of the animals is a predictor of some type of mental or physical state of prolonged pain in the Portuguese veterinary doctors. Veterinarians are constantly dealing with sick, victimized or threatened animals. These professionals develop health problems such as stress or burnout as a result of compassion and constant care with others (Compassion Fatigue). However, this profession of help is also capable of generating pleasure (Compassion Satisfaction). In this sense, we intend to investigate the effect of permanent and
prolonged contact with pain and if this contact results in some kind of fatigue, social, mental, cognitive, motor or other degradation, analysis. Fatigue can be subtly manifested by the degradation of perceptual, mental, and intellectual activities, such as productivity, qualitative decrease in performance, increased number of errors, sleep deprivation, variations in interpersonal relations, decreased motivation, and associated depressive states to depressive mood, pessimism, insomnia, asthenia, guilt and despair, and in some cases leads to suicide.

Suicide is also a serious concern in this professional group considered to be at high risk. International studies reveal great psychosocial vulnerability. Bartram and Baldwin (2008), in a study with the British population, concluded that veterinary surgeons are four times more likely to commit suicide than the general population and about twice as many as other health care professionals. Although contexts have been neglected, they are important as moderating variables. Scientific research has reinforced the importance of contexts in general (Dejours & Bègue, 2009; Nakayama & Amagasa, 2004; Steenland, Burnett, Lalich, Ward and Hurrell, 2003) and work contexts of vets in particular (Meltzer, Griffiths, Brock, Rooney & Jenkins, 2008). The fact that veterinarians practice their professional activities in various contexts, such as illness, pain and death, makes them vulnerable to various psychosocial risks to others and to themselves from a sensory, affective, cognitive, emotional and behavioral. However, this closeness to suffering can predict satisfaction (compassion) and / or fatigue (compassion) and stress (Stamm, 2010).

Compassionate satisfaction has been described as the ability to receive gratifying aid for the care provided. The professional can develop positive feelings about their ability to help, such positive aspects related to altruism develop satisfaction through compassion and this occurs when the professional experiences joy for helping others in sickness, weakness, frailties or otherwise. In this sense, there is an empathic relationship, if through empathy we understand the altruistic motivation without intention of reimbursement or reward. There is therefore no direct benefit and although unwanted effects may result, the practitioner feels instigated for action. The point is to know what instigates the professional for action. Opinions, however divergent, complement each other. Thus, there seems to be some consensus in the scientific community about the multidimensional nature (Davis, 1980; 1983) on cognitive (Eisenberg, Strayer, 1987) and cognitive-behavioral motives (Davis, 1980). Eisenberg and Strayer (1987) relate satisfaction by compassion for empathy and conformity of human conduct to the customs that regulate society, morality and the need for adjustment to norms, adjustment that enables social and moral approval. In this sense, compassionate satisfaction is a protective factor for the adverse effects of work, especially professionals who perform certain tasks or functions: caregivers, doctors, nurses,
veterinarians, social workers, among others.

In turn, compassion fatigue is a risk factor. The literature defines it as the psychological and physical state of fatigue and exhaustion by the effect of permanent and prolonged contact with the pain of others (Figley, 1995; 2002a; 2002b). The reasons for the occurrence of this psychological phenomenon are related to the proximity of the professional to the suffering. The various experiences of daily suffering experienced, and in certain cases of death; does not allow professionals to psychologically process mourning. In this sense, compassion fatigue occurs when the professional can not manage in a healthy way the negative feelings that emerge from the patients' suffering and, as a consequence, manifests somatic and psychological responses to their work. It is, therefore, a problem of mental health at work, which is urgent to prevent, fundamentally because it can only result from an experience of exposure to the traumatic situation, depending, therefore, on the degree of empathy of the professional with the patient and the greater or lesser capacity of internalization.

Joinson (1992) pioneered the investigation of compassionate fatigue, studied a specific population (nurses) and considered that this syndrome progresses from the discomfort of compassionate state, to the stress of compassion, fatigue through compassion, and permanent stress. Their theoretical conception has influenced subsequent investigations (Figley, 1995; Stamm, 2010) mainly regarding the definition of the concept and its specific demarcation in relation to primary and posttraumatic traumatic stress (Shalev, 2001). Compassionate or kindly (compassionate) fatigue is an emotional response of the subject in a predominantly working context. In this sense, it stems from the exercise of a function and the empathic cost of dealing with the suffering of others, it is a threat to mental, physical and emotional health.

As has already been stated, compassion fatigue is a syndrome that combines secondary traumatic stress and professional burnout. It is manifested by the emotional and physical fatigue that certain professionals experience due to the empathy in the exercise of the professional activity. At the origin of the fatigue of compassion is empathic experience. This is a fundamental variable for the study of human conduct, despite the diversity of interpretations: the other as self, me in the place of the other or feel the other in me. Empathy is associated with altruism and spiritual experience and the emotional components that generate understanding, tenderness, and feeling.

Compassionate fatigue involves feelings of emotional exhaustion and frustration with work, typical of burnout and work-related traumas, typical of secondary traumatic stress (Stamm, 2010; Thomas, 2013). We know today that people exposed to traumatic stressors are more likely to develop negative symptoms associated with exhaustion, depression, and post-traumatic stress, recognized in the literature as secondary trauma or vicarious trauma. Zeidner, Hadar,
Matthews and Roberts (2013) in an investigation with health professionals also identified some personal predictors of compassion fatigue, including: emotional management, emotional intelligence characteristics, context-specific coping strategies, and negative affect. Compassionate fatigue is characterized by physical and emotional fatigue in caregivers of people or animals in distress; arises when the professional can not manage in a healthy way the negative feelings that follow from the suffering of those who provide assistance.

The relationship between burnout syndrome and compassionate fatigue remains controversial (Dunkley & Whelan, 2006; Sabin-Farrell & Turpin, 2003). Some authors argue that compassion fatigue would be an advanced stage of burnout, others consider that compassion fatigue and burnout syndrome are a single phenomenon assigned in different ways, and finally, the most consensual line that considers burnout syndrome of the dimensions of compassionate fatigue (Stamm, 2010).

Traumatic secondary or vicarious stress, in turn, refers to the negative feelings developed by the professional about their ability to help. Barlow (2016) considers that the professional's exposure to aversive stimuli causes prejudice to cognitive schemas in relation to oneself and the world and may lead to lasting changes in premises and expectations, which affects feelings, behaviors and relationships. In the same sense, Sabin-Farrell and Turpin (2003) and Thomas (2013), consider that the development of problems associated with negative aspects of the provision of professionals can affect the individual, family, others and organizations. Such negative effects are aggravated by the severity of exposure. In this case, the results may include burnout, depression, increased substance use, and symptoms of post-traumatic stress disorder. Dunkley and Whelan (2006) acknowledge that working with clients or traumatic situations may trigger similar reactions in practitioners, although there are not enough empirical studies. The same authors also consider that there is not enough terminological consensus. They argue that the most appropriate concept is vicarious traumatization by incorporating the two elements of the relationship: the caregiver and the object of care. In this sense, vicarious traumatization concerns the caregiver's emotional affection as a result of empathic attachment to care (Pearlman & Saakvitne, 1995) and also consider that experience, personal history of trauma, and coping style influence trauma vicarious.

II. METHOD

Participants- The sample is comprised of 1425 subjects, 33% male and 57% female, mostly married or in de facto union, without children, mostly licensed after 1997, working for others and the main activity is the animal clinic company. The ages ranged from 24 to 88 years (M = 37.4, SD = 9.7); 53.8% are married, 41.5% are single, 4.6% are divorced; 58.7% do not have children,
18.4% have one child and 17.9 two children, 4.3% have three children; 50.3% have a stable employment relationship; 61% of veterinarians graduated after 1997; 47% receive monthly gross income up to 1000 euros, 32.8% from 1000 to 1500 euros and 5.2% between 1500 and 2500; 74.3% carry out their professional activity related to pets; 62.4% work as employees, 13.4% in the Public Service and 24.2% in their own account; 59.5% exercise 40 hours a week and 36% more than 40 hours.

**Instruments**

Socio-demographic questionnaire, consisting of multiple choice questions: gender, marital status, graduation year, gross monthly income, work situation, main activity area, workload, work regime, weekly workload and secondary activity.

Professional Quality of Life Scale / ProQOL-IV (Stamm, 2002; 2010). Composed by three dimensions: Satisfaction by Compassion (SC); Burnout (Bu) and Secondary Traumatic Stress (STS). Validated for the Portuguese population by Cortês Carvalho (2011). The option for this instrument is justified by its ability to analyze care professions and professionals who carry out their activities to people or animals in situations of suffering.

The Compassion Satisfaction (SC) configured by the items: 3, 6, 12, 16, 18, 20, 22, 24, 27, 30; Burnout (Bu) by items: 1, 4, 8, 10, 15, 17, 19, 21, 26, 29, items 1, 4, 15, 17 and 29 are reversed; Secondary Traumatic Stress (STS) for items: 2, 5, 7, 9, 11, 13, 14, 23, 25, 28. Although Compassionate Fatigue is not reported in the Statistical Diagnostic Mental Disorders Handbook, national and this instrument is justified in terms of diagnosis to professionals who exercise caregiver activities and the use of the social security system (Adams, Boscario & Figley, 2006), the protection of minors (Conrad & Kellar-Guenther, 2006; Wies & Coy, 2013), as well as in the literature on health care, nurses (Beck, 2011; Taylor, Bradbury-Jones, Breckenridge, Jones, & Herber, 2016; Mashego, Nesengani, Ntuli, & Wyatt, 2016), among others.

**III. PROCEDURES**

The questionnaires were applied online, distributed through the National Union of Veterinary Doctors and the Veterinary Medical Association. The veterinarians were informed about the objectives of the investigation, participated freely and were able to give up at any time.

**IV. RESULTS**

We used the SPSS software version 23.0 to perform the statistical analyzes. In order to test the normal distribution of the sample, the Kolmogorov-Smirnov test was used "to decide whether the distribution of the variable under study in a given sample comes from a population with a specific distribution" (Maroco, 2003, p 112). To analyze the predictors of SC, STS and Bu, we performed the hierarchical linear regression analysis (enter method), considering these as dependent variables and the variables of the sociodemographic questionnaire as independent variables. We also carried out the descriptive analyzes and the
calculation of the Cronbach's alpha value. SC assesses the pleasure of veterinarians in helping animals and their host families and their professional contribution to society and its humanization. This dimension obtained the Cronbach's alpha value of .90, which is higher than the results obtained by the original validation (.88). In turn, Cronbach's alphas of the items oscillate between .90 and .88. The items with the highest results are: I am pleased to be able to help animals and people (M = 4.46, SD = .69); I like my job as a veterinarian (M = 4.07, DP = .96); I feel proud of what I can do to help (M = 3.86, SD = .93); I have good thoughts and feelings about the ones I help and how I can help them (M = 3.74, SD = .84). The item, I think I am a success as a caregiver got the lowest value (M = 2.85; DP = 98).

The Cronbach's alpha of the Bu dimension is low, although acceptable for having a value equal to .70. Dimension is associated with feelings of hopelessness, difficulties in dealing with work or in doing so effectively. Bu in this professional group is predicted by variables related to the main activity and the labor situation. Thus, professionals who practice pet clinics, food safety and sanitary inspection have higher levels of Bu. In turn, gross monthly income, marital status, employment status and year of graduation also contribute significantly to this depressive disorder.

The STS dimension refers to secondary exposure to traumatic events. It happens in professionals who care about those (animals) who experience traumatic events. Traumatic stress is divided into primary and secondary traumatic stress, the first, when the practitioner places himself directly into the danger space (e.g., Municipal Slaughterhouses); the second, is associated with some events. Cronbach's alpha is .83, similar to the original scale (.81). The items with the highest values are: I am worried about more than one animal or host family that I help (M = 3.54, SD = 1.11), I find it difficult to separate my personal life from my professional life as a veterinarian M = 3.65, SD = 1.24). The lowest average item is: As a result of my help, I have intrusive and scary thoughts (M = 1.71, SD = .99). SC explains 36.65% (SD = 6.16); STS accounts for 23.84% (SD = 6.37) and Bu Explains 32.40% (SD = 4.09). Being SC explained by age, gender, gross monthly income, employment status and graduation year; STS explained by the monthly gross income, the year of graduation and the labor situation.

V.DISCUSION

The results indicate that in this professional group there is an altruistic motivation (SC), derived from its capacity to assist in the health and quality of life of the animals, in the technical support to the families, in the resolution of clinical cases and in the man-animal relationship, be affected by age, monthly salary, marital status, employment status and graduation year. The professionals who carry out these activities are, for the most part, protected from the point of view of quality of life. The satisfaction that results from the ability to help through
the exercise of the profession is gratifying and compensates for the adversities of certain medical or therapeutic occurrences with which the professionals debate. Kane, Hart, Fine, Cooper, Patterson-Kane, Houlihan, and Anthony (2017) found in their investigations the relationship between the professional's suffering and the decision of the medical act of practicing euthanasia in companion animals. In our investigation it is more significant in professionals who exercise control and sanitary inspection because this can cause damage to public health on a large scale, thus justifying high BU levels. STS, on the other hand, is predicted by the working conditions and mainly by the professional instability of trained veterinarians after 1997. The results also indicate that younger Portuguese veterinarians suffer from severe professional instability, low wages and reduced public contracting, working mostly (57.3%) on behalf of others and in a poorly stable labor situation and these variables are predictors of STS.

VI. CONCLUSIONS

Although European reports indicate that about a quarter of workers feel stressed most of the time (Eurofound and EU-OSHA, 2014) because of the high intensity of work, tight deadlines and imbalance between work and family life. This study also points to other factors, namely: low wages, job instability, professional responsibility. It also indicates that there is no policy for the hiring of young people recently graduated from the public sector and that precariousness and low wages constitute a risk factor.

VII. REFERENCES

2018 International Conference on Applied Psychology and Human Behavior

Institute of Knowledge and Development 2018

ISSN 2184-3937


Steenland, K., Burnett, C., Lalich, N., Ward, E., & Hurrell, J.


Eurofound and EU-OSHA, 2014
A Stakeholder Engagement Framework for Developing Sustainable Behaviour Research: A Lake Victoria Case study

van den Broek, Karlijn
Research Centre for Environmental Economics, University of Heidelberg
Heidelberg, Germany
karlijn.vandenbroek@awi.uni-heidelberg.de

**Abstract**—Stakeholder engagement has increasingly gained popularity in sustainability research. The approach promotes research that is relevant, that has impact and that can inform evidence-based policy. Nevertheless, little social science research investigating sustainable behaviours has been developed with this bottom-up approach. This paper provides guidelines on how stakeholder engagement can be applied in this field, illustrated through an example of stakeholder engagement at Lake Victoria, East Africa. The paper concludes with key lessons learned from this case study.

**Keywords**— Stakeholder Engagement, Impact, Sustainable Behaviour, Developing Countries

I. INTRODUCTION

In the past few decades, a trend has been unfolding in the academic sphere in which the focus has shifted from theoretically interesting research to research that has a real-world impact. This impact-focus means that research is increasingly employed to investigate, and provide solutions for, societal issues such as climate change, social inequality and wellbeing. These days, research funding is often contingent on the relevance and expected impact of the research project[1], and policy-makers increasingly use the findings of research to develop evidence-based policy.

One approach to ensuring research impact is stakeholder engagement. Stakeholder engagement is the active involvement and participation of people who are directly or indirectly affected by the research project[2]. This could mean involvement in shaping the direction of the research, participation in the research, or the communication of the research findings to relevant parties. Stakeholder engagement should be mutually beneficial through a process of knowledge exchange[1]. This approach has especially gained popularity in the environmental domain including environmental management [3], social corporate responsibility [1], biodiversity research [4], marine spatial planning [5], climate change [6] and climate adaptation [7]. However, little research investigating environmental conservation behaviour has employed such a bottom-up approach. This is despite social sciences being a perfect candidate for stakeholder engagement given its rich methodology and socially relevant research agenda. This field could therefore strongly benefit from adopting such approaches that will further ensure the application of social sciences to relevant societal issues and the application of the findings beyond the scope of the research project.

This paper will present a framework for involving stakeholders in the development of a sustainable behaviour research project. This framework has been developed by the author for the development of a conservation research project at Lake Victoria, East Africa. This research project focused on conservation practices at the lake and was developed by an interdisciplinary research team of social scientists. This team had received seed funding to develop a research proposal focused on ecological tipping points in large lake systems. What was important for the development of this project was the engagement of local stakeholders to ensure that the outcomes of the research project are relevant and can be applied to address real issues in society. Hence, the stakeholder’s role in the development of the project was of utmost importance to assure their support for the research project and that the findings could be used to induce positive changes in the region. This paper therefore illustrates how a stakeholder approach can be used in a meaningful way and which challenges one might encounter. The following will discuss the stakeholder engagement process, and the lessons learned, using the development of the research project at Lake Victoria as a case study.

II. THE STAKEHOLDER ENGAGEMENT PROCESS

The stakeholder engagement process is a dynamic, non-sequential process for which no fixed template can be designed. Stakeholders should be involved from start (defining the research agenda) to finish (communicating and implementing the research findings). However, this paper will only report on the first phase: the development of the research project. A unique 10-step stakeholder engagement plan was developed by the author and will be presented here. These steps include: 1) establish the framework of the project, 2)
stakeholder analysis, 3) connect with stakeholders, 4) problem analysis, 5) development of research concept, 6) gain feedback from stakeholders, 7) testing methods in the field, 8) revise research concept, 9) final feedback workshop, 10) final revision phase. These should be taken as a guiding framework to help the researcher along the way, but it is important that this process is adapted to the needs of the individual research project and the stakeholders.

A. Step 1: Establish the Framework of the Project

The development of an applied social research project should always start with a clear project definition developed by the research team. Although enough room should be left for the stakeholders to define the research agenda, a general framework within which the project can be developed should be established. This framework may be based on the requirements of a particular funding call and the expertise of the research team.

In our case, the funding call from BMBF (the German Federal Ministry of Education and Research) clearly stated that the research project should focus on ecological tipping points, should be a collaboration between social and natural scientist, using local data where possible. Our team consisted of environmental and cognitive psychologist as well as environmental and behavioural economists. The framework for the development of this research project therefore focused on economic and behavioural aspects of ecological tipping points. Lake Victoria was chosen as a case study due to the various ecological tipping points that the lake had undergone and is likely to experience again.

B. Step 2: Stakeholder Analysis

Handbooks provide guidelines on how best to conduct a stakeholder analysis as a first step of the stakeholder engagement process. This process often consist of three steps: 1) identification of stakeholders, 2) categorization of stakeholders and 3) understanding (relations between) stakeholders [2], [8]. What is of crucial importance in this process, is that various types of stakeholders are included to ensure that diverse views are represented. The ‘snow sampling’ technique is often recommended in the first step of identifying stakeholders [9], [10], in which individuals are identified through current contacts, who then identify further contacts until enough stakeholders are selected or no further stakeholders are identified. However, one needs to be mindful that such an approach may result in biased sampling if these contacts only tend to have contacts in their network that represent a certain type of stakeholder. Where possible, it would be best to have an unbiased partner on the ground that can help with such a stakeholder analysis and can serve as a ‘way in’ to establish contact with the stakeholders. For example, in our project we approached GIZ (the German International Development Agency) that operates at Lake Victoria and was willing to share their contacts with us.

After this identification process, the stakeholders need to be categorizes in terms of priority and role (e.g. businesses, NGO’s, communities, government) to select the stakeholders to be contacted. Finally, it is important to learn as much as possible about the stakeholders to understand their vision and aims prior to contacting them [1].

C. Step 3: Connecting with Stakeholders

Before the stakeholders are contacted, it is useful to develop a strategy to engage the stakeholder. We drafted an information sheet that introduced the research team, summarized the research framework, what we expected of the involvement of the stakeholders in the project and how they can benefit by participating. When approaching each stakeholder, it is important to emphasize why they have been selected to take part in the project, by linking their unique expertise and interest to the research project. Not only does this help encourage the stakeholder to take part in the development of the project, this also demonstrates interest in the stakeholder. First contact is often best made through phone rather than email contact, as this is a more personal approach, especially when working in developing countries where access to email may be more limited. When the stakeholder is interested in the project, set up a face-to-face meeting and provide an agenda ahead of this meeting to allow the stakeholder to prepare for the meeting and know what to expect.

D. Step 4: Problem Analysis

This first meeting with the stakeholders will serve as a first step in the problem analysis phase. Start this meeting by introducing the research team, re-stating the scope of the research project, why they have been selected and what is expected of the stakeholders. Next, interview the stakeholders about what they perceive to be the most pressing issues in the area, and why [2]. Follow-up by asking participants to explain the process of the issue, by describing its drivers, consequences and mitigation strategies [11]. Participatory tools (e.g. fishbone diagram, force field analysis) can be particularly useful for this [3]. Take notes and develop a coding scheme to identify recurrent issues discussed by the stakeholders. This analysis will result in a matrix of issues discussed across stakeholders (see Table 1), and what particular aspects of the issue were discussed by each stakeholder. This overview will demonstrate which issues were most often discussed and perceived to be the most important issue by certain stakeholders, which will help the further selection of stakeholders. In our case, this resulted in 19 different issues that were discussed by the stakeholders, ranging from environmental conservation issues including water pollution and declining fish stock to social issues such as increasing HIV rates, gender inequality and governance issues including land ownership and enforcement of fishing regulations.

<table>
<thead>
<tr>
<th>Problem Analysis Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issue 1</td>
</tr>
<tr>
<td>Issue 2</td>
</tr>
<tr>
<td>Issue 3</td>
</tr>
</tbody>
</table>

The next step is to learn more about the issues brought up by the stakeholders through site visits, consultation of experts.
and through literature reviews. Explore what has already been studied in relation to the issues, and where the gaps are. Finally, select one issue that will be the focus of the research project by considering which issue stakeholders perceived to be most important, what the gaps are in the research and where the researcher-team’s skills and expertise can have the biggest impact.

After carefully reviewing the issues and literature, our research team decided to focus on the declining fish stock at Lake Victoria as this was the most frequently discussed issue by stakeholders, was in line with the funding call requirements, and matched the skills and expertise of the research team.

E. Step 5: Development of Research Concept

Now that the focus of the research project has been determined, the research concept can be developed. Start with the aim of the project, and derive the research questions from this. When designing these questions, it is important to keep the funding call’s requirements in mind, as well as the research team’s skills and expertise and how the research can have the highest impact on the issue to be addressed. At this stage, it is useful to already develop a range of preliminary research designs to answer the research questions to make the research concept more concrete. Before presenting the research concept to the stakeholders, identify possible weaknesses and opportunities in the research concept, especially in terms of implementation. These considerations should be addressed in the next step and are particularly important when conducting research in developing countries, as was the case for our research project. Specific concerns for this project included practical issues such as logistics, research assistants as well as opportunities such as existing data and networks and platforms among the stakeholders.

F. Step 6: Gain Feedback from Stakeholders

Organize a second meeting with the stakeholders to present the research concept and obtain their feedback [1]. If possible, invite various stakeholders for a workshop so that stakeholders can interact and discuss the research concept in a group setting [2]. In this meeting, present the findings from the previous stakeholder meetings including the list of stakeholders and issues that have been discussed by these stakeholders. Explain which topic has been selected for the research project and how this issue is understood. Present the research aims and research designs in an accessible way without using academic lingo to ensure stakeholders have a good understanding of the research plan. This may mean leaving out methodological or theoretical details and focusing on the parts that resonate with the stakeholder.

Ensure the workshop is as interactive as possible, by stimulating stakeholders to be critical, asking them specific questions (e.g. questions in relation to implementation). This is a key moment for stakeholders to highlight any issues that they may foresee with the current research concept and it is therefore of utmost importance that stakeholders feel free to voice such concerns. This is also a great opportunity to start discussing the dissemination of the findings, and how the stakeholders can assist in this through their networks[1]. Moreover, it is important to discuss with the stakeholders how they will be involved in the implementation of the research project and to discuss expectations.

We organized various workshops across the three riparian countries to present our research concept and gain feedback from stakeholders. These meetings were particularly helpful to capture the excitement of the stakeholders for the project, to fine-tune the research topics and to get practical advice for the data collection phase of the research project.

G. Step 7: Testing Methods in the Field

It might be advantageous to use the field-visits to try out methodology that has been designed as part of the research concept. Simple methods may be tested in the workshop with the stakeholders, which has the added benefit of making the methodology of the research more tangible to the stakeholders. This provides stakeholders or other participants the opportunity to provide feedback on the methods. Moreover, this test-trial will demonstrate the feasibility, validity and appropriateness of the methods as well as practical limitations that may not have been anticipated otherwise [3].

We tested a methodology to assess mental models and tested this with fishing communities at Lake Victoria (see Figure 1). This was extremely valuable experience as it demonstrated that 1) social dynamics strongly influenced the task 2) many fishers who were less literate felt intimidated by the task. Therefore we learned that we had to develop an alternative methodology to assess the mental models in developing countries.

H. Step 8: Revising the Research Concept

Based on the feedback gained in the field, the research concept can be further revised and refined. It is important to take all the feedback from stakeholder seriously, but at the same time be aware that some feedback may be more relevant to the research project than others may. The feedback from stakeholders may mean having to go back to the drawing board, revisiting the research questions, or selecting different types of methods to answer the research questions [3]. If fundamental changes are made to the research concept during
this phase, it is important to stay in close contact with key stakeholders to ensure that the revised research plan is in line with the expectations of the stakeholders.

The workshops had shown us that we were on the right track: stakeholders were enthusiastic about the research project, and believed in the relevance and impact of the concept presented. The research concept was further developed based on the stakeholder’s feedback. Specifically, brain storm sessions conducted during the workshop on possible intervention studies had been particularly fruitful and inspired new research designs. Moreover, the available data that was presented by our stakeholders during the field visits allowed us to enhance the existing research designs and generate more ideas on how to address the research questions by analyzing this existing data pool. Importantly, the field visit had demonstrated that a revision of the methodology was imperative. During this revision phase, a mental model elicitation tool was developed for illiterate populations to resolve the issues encountered in the field.

I. Step 9: Final Feedback Workshop

A final feedback session should be held to provide key stakeholders with the opportunity to comment on the revised research concept [2]. A similar agenda as the previous meeting can be employed in which the research ideas are presented and stakeholders are invited to share their thoughts. However, in this stage, it is important to provide stakeholders with all the details that they require to assist the research team with useful suggestions and comments. Moreover, in this stage, stakeholders need to be informed how their feedback has been incorporated in the revised research concept [2]. It is therefore recommended to send the stakeholders a summary of the research plan ahead of this workshop. Again, it is advised to make such a workshop as interactive as possible, for example by conducting a participatory SWOT analysis with the stakeholders and having a list of specific questions for the stakeholders [2].

For this workshop, we invited our key stakeholders (by now partners!) that consisted of two specialized institution of the East African Community that are responsible for the sustainable management of the Lake Victoria Basin (LVBC) and the fisheries resources of Lake Victoria (LVFO) respectively. The workshop was also attended by a German NGO that promotes sustainable fishing at Lake Victoria through certification (Naturland) and our interdisciplinary academic advisory board. This workshop has proven to be crucial in the success of the project as the participants pointed out inconsistencies in the research plan that had previously been overlooked. The participants also provided helpful suggestions to advance the research plan. In particular, stakeholder’s knowledge on the lake’s ecology proved to be indispensable to finalize the research plan successfully.

J. Step 10: Final revision

After the final feedback workshop, the research team should agree on a plan to incorporate the feedback from the workshop in the research project. Ideally, this stage mainly consists of fine-tuning and editing, but do not hesitate to make fundamental changes in this stage if the stakeholders and researchers agree that this is necessary to ensure the quality and impact of the research. Again, it is important to stay in close contact with stakeholders if this is necessary. The final product (in case of a research proposal) should of course be shared with all the stakeholders. This could be accompanied with a short survey to assess the stakeholder’s experience in the development of the research project. Such feedback will be extremely valuable for the continuation of the project and reduces the chances of possible future miscommunications or conflicts. Inform the stakeholders about the next steps, to ensure that they know what to expect of the research team and what is expected of them.

III. Key Lessons Learned

The stakeholder engagement process can be challenging, especially with international, intercultural and interdisciplinary research projects, as is often the case for research projects nowadays. Hence, this process has been an enlightening process, from which lessons has been drawn. These key lessons will be described below and serve as recommendations for future researchers planning to conduct stakeholder engagement processes to develop sustainable behaviour research projects, especially in developing countries.

A. Clear Communication

Good communication with the stakeholders is the most important determinant of a successful collaboration, but perhaps also the most challenging one. Differences between the stakeholders and the researcher in educational background, languages, cultures, interest and jargon are likely to hinder a smooth communication flow. Moreover, different kinds of stakeholders require different communication styles and levels [2]. By using simple language in emails, presentations, conversations and reports, many misunderstandings and miscommunications can be avoided, or at least identified in an early stage. In our project, a misunderstanding was created among the stakeholders in terms of employment opportunities that might accrue from the research project for their organizations. This was a result of unclear language used from our side that did not spell out what the stakeholders could and could not expect in terms of employment opportunities.

One technique to avoid such miscommunications is to mirror the stakeholders communication style by identifying the specific lingo and styles that are adopted by stakeholders and using this style in your communication to the stakeholders (e.g. observe the lingo on their websites or emails). This also avoids stakeholders potentially feeling intimidated by the researcher team and eases the relations. Importantly, when communication is simple and clear, this gives stakeholders the optimal opportunity to contribute to the research agenda.

B. Stakeholder Interaction

Stakeholders should be involved frequently throughout the research process [2]. Many stakeholders met in the field reported having felt used by previous researchers because the
researchers failed to keep the stakeholders informed about the development of the project. By keeping the stakeholders informed, for example through a newsletter, the stakeholders feel involved and are able to contribute throughout the entire process. It is important here that the stakeholder interaction is a two-way street, meaning that stakeholders can contact researchers throughout the research project. The stakeholders and researchers can develop a communication plan that lay out platforms for communication.

C. Manage Expectations

Throughout the process, managing stakeholder’s expectations is of key importance. This refers to both the expectations of the researcher and the stakeholder in relation to the aims of the project and what the project can realistically expected to achieve. Moreover, stakeholders will also need to be informed about how they will (and will not) benefit from the project. Managing expectations avoids disappointment, dropouts, and makes the process more productive by guiding stakeholders on the scope of the project, thereby making their comments and suggestions more realistic and beneficial for the development process.

In the first meeting with the stakeholders, many reported being uncertain of what they could expect of the project and what was expected of them, despite the information sheet that had been shared with them. Once this was further explained to the stakeholders, this cleared the air and significantly benefited the discussions and contributions of the stakeholders.

D. The Researcher’s Attitude

Interacting with diverse stakeholders with different backgrounds requires certain attitudes on the researcher’s end. First, the researcher needs to be flexible as the stakeholder engagement process naturally implies the dependency on external sources that will shape the research process. With this comes a sometimes unpredictable and dynamic process and less control on the researcher’s end. It is important that the researchers are willing to adapt to this and are open to the stakeholder’s point of view. Moreover, when interacting with stakeholders from different cultural backgrounds the researchers need to be mindful of cultural differences and adapt accordingly.

East African countries tend to place a greater emphasis on the hierarchies in society compared to western countries [12] and it is important to respect this while engaging with local stakeholders. For example, through the communication with the stakeholders it became clear that using the appropriate titles is a necessity in order to demonstrate respect in East Africa. Another important consideration is dressing appropriately, meaning dressing formally when meeting with policy makers to demonstrate respect, but less formally when meeting with communities in order not to intimidate.

Finally, it is important for the researcher to be humble and treat stakeholders as equal. Stakeholders may not have enjoyed the same education as the researcher but provide the research project with invaluable knowledge and perceptions. Researchers should appreciate that the researcher and stakeholders hold different, complimentary knowledge and skills and use this to advance the research to address the issue of interest.

IV. CONCLUSION

The stakeholder engagement process can be an enjoyable and fruitful process but is never without challenges and lessons to be learned. Research addressing sustainable behaviours would strongly benefit from adopting stakeholder engagement approaches and this paper has attempted to provide guidelines for such projects. Using a stakeholder engagement process at Lake Victoria as an illustrative example, the process and key recommendations have been presented. By being sensitive to the stakeholder’s point of view, the relevance and impact of the research project can be significantly enhanced.

ACKNOWLEDGMENT

The author would like to thank the MultiTip team for their guidance and contributions to the development of the stakeholder engagement process.

REFERENCES


Welcome Onboard this Fight.

Ana Maria Vieira  
Master of Aviation Safety and Continuing Airworthiness  
Technological Institute of Aeronautics (ITA)  
São Paulo, Brasil  
anavierasafety@gmail.com

Abstract—Air Rage and Sky Rage are terms used to describe violent behavior committed by passengers or crew, which threatens the security of a client or a crew member during the flight. Although there still is not a database with the number of air rage caused by crew members, we can see a significant increase in such cases. People with poor social skills have high levels of stress, resulting in frustration and can generate angry outbursts. According to Air Transport Association Air Rage has become the most significant daily threat to airlines, overcoming bomb suspects and terrorist attacks. One of the results of the research shows that a training centered on Conflict Risk Management would work as a tool of psychological control, cognitive and motor responses, connecting all components and ensuring equal consideration for all the answers, thus avoiding "triggers" that lead to air rage. The conclusion points out an urgent need to promote an Air Rage Management Plan in airlines which would contribute effectively to develop and implement risk management initiatives to increase safety and minimize risks.

Keywords—Air Rage, Aviation Safety Conflict Risk Management, Communication Skills.

I. INTRODUCTION

International Civil Aviation Organization (ICAO) defines air rage as every verbal act or threat of action committed by any person on board an aircraft, whether on earth or in the air, which can harm the crew, passengers, ground staff, or that can divert the crew from its duties, compromise flight safety, or disturb other passengers, including irregularities committed under the air navigation order [14].

According to data from the International Air Transport Association (IATA), there were 9,315 incidents involving unruly passengers worldwide in 2014 and that went up 14 percent in 2015 to 10,854. The trend stabilized in 2016, however, and fell slightly to 9,837 incidents, equating to 1 per 1,434 flights [14].

The statistics show that the overall number of reported incidents declined about 10 percent in 2017. While that's a modest drop from the 10,854 incidents reported in 2015, IATA believes airlines underestimate or under-report the extent of the problem.

IATA (Association, Doc 10034, 2016) notes that in 2016 numbers show a troubling increase in the times (11% in 2015 to 12% in 2016), incidents escalated from simply verbal, to incidents that involved physically abusive or obscene behavior, verbal threats of physical violence or tempering with emergency and safety equipment [2].

A growing number of researchers have been studying air rage, however most of these studies have focused on the passenger. The main distinction of this work compared to others is also to highlight the stress of the crew members and ground staff as a key contributor of angry outbursts and as a contributing factor to the increase cases of air rage caused by passengers. If, on the one hand, customers’ complaints have increased, on the other hand, airlines officers also suffer from stress.

Working for an airline has lost its glamour. Recent months have brought a variety of new pressures, wage cuts and reductions in the number of crew members on board, shorter meal plans, flight delays, lack of security, lack of civility in the attitudes of passengers and other factors cause frustration, resentment and depression in many people. At the same time, the list of rules and responsibilities is still growing.

According to National Association of Flight Attendants in the United States, a lot of employees are going through post-traumatic stress and there is a consensus that the airlines are not doing anything to improve the situation.

Crew members bring the stress of their lives onto the plane. They are working too hard with lower payment. They are worried about money, politics, health care, or their family. Crew members and ground staff are working more hours than they were a few years ago. Fatigue, resulting in stress and frustration, can generate a more aggressive attitude towards customers. The emotional baggage of airline staff no X-ray can check.

II. RAGE IS IN THE AIR.

Air Rage can result in violent verbal protests about the airline or even verbal or physical violence towards flight dispatchers, security officers, crew members and other passengers. They fight for a place to store their carry-on luggage, to save time or avoid a fee and they fight for the arm rest and bathroom queues. "Some people go on American air carriers angry from the start." (J.Ostrower, 2017) [10]

In February 11, 2009 a man accused of breaking a ticket agent's neck in a bout of air rage was acquitted of assault in a case that focused attention on rising tempers among the nation's airline passengers. John C. Davis claimed he acted in self-defense and only after the agent shoved his wife as she tried to retrieve their 18-month-old daughter, who had wandered up a passageway leading to a plane. He faced up to 10 years in prison.
A survey conducted by IATA (Association, Doc 10034, 2016), based on reports presented by airlines, pointed out the main factors that contribute to the triggering of air rage.[2]:

a) Intoxication by alcohol, narcotics or medicines, often beginning before the passenger goes on board the aircraft; - the abstinence from smoking leads some people to ingest antidepressants and alcohol as a replacement to nicotine.

b) Tight and crowded cabins - contributing factors to the feeling of invasion of privacy and loss of individuality.

c) Irritation by the actions of other passengers on board;

d) Frustration on the trip

e) Mental breakdowns or similar episodes such as acute anxiety, panic disorder or phobias;

f) Environmental factors that surround the act of flying, for example, the gathering of large crowds at airports, having to sit and travel in a confined space, fear of flying.

g) Discomfort generated by the minimal space for the legs because of pain and stress.

Hethcock (2018) reported in his article “American Airlines crew zip-ties, duct-tapes unruly passenger in latest airborne altercation” that in American Airlines crew restrained a passenger with zip ties and duct tape after she allegedly bit and kicked flight attendants during the landing of Flight 1033 from Dallas to Charlotte, North Carolina[8]. The passenger, 36-year-old Charlene Sarieann Harriott, was charged on Thursday, one day after the violent incident that occurred while the plane was just 200 feet off the ground. Three flight attendants attempted to restrain Harriott in the plane's first-class section using duct tape and zip ties around her ankles and wrists, but she bit one in the forearm and kicked the other two in the arm, leg, and abdomen, according to the court document filed by the FBI. All three flight attendants were treated for injuries at American Airlines' on-site clinic.

The disturbance aboard Flight 1033 is the latest in a series of ugly and sometimes physically violent encounters between airline passengers and cabin crews. Most recently, a woman aboard a Southwest Airlines flight from Portland to Sacramento threatened to kill fellow passengers in a dramatic episode captured on video “I swear, if you don’t (expletive) land, I will (expletive) kill everybody on this (expletive) plane!” the 24-year-old woman yelled at a flight attendant.

Clearly, the focus is on air incidents and an emphasis is placed on reactions to control the disturbing behavior of unruly passengers. These measures include, for example: legal actions, fines, passenger restraining devices and efforts to protect the cockpit.

We need to think of proactive actions, carried out with the airplane on the ground, before boarding, which help preventing the passenger from becoming an aggressor. Avoiding Air Rage is a huge step towards making flights safer.

A. The different levels of air rage defined by the FAA.

Level 1: Disruptive behaviors which are mainly verbal in nature such as failure to follow crew instructions or violation of a safety regulation. Often these can be managed by crew through Communications Skills training. 87% of reported incidents (Association, Unruly Passengers, 2017)[1].

Level 2: Physically abusive or obscene behaviors, verbal threats of physical violence, tampering with emergency or safety equipment. These are difficult to manage in the confines of an aircraft. 12% of incidents (Association, Unruly Passengers, 2017)[1].

Level 3: Life-threatening behavior or attempt to break cockpit door. 1% of incidents. (Association, Unruly Passengers, 2017)[1].

An IATA survey found that Unruly Passengers is one of the key concerns of cabin crew along with unexpected turbulence and inadvertent slide deployment.

III. CREW ON THE VERGE OF A NERVOUS BREAKDOWN

Passengers have complained that crew members sometimes increase the voltage on board provoking passengers with inopportune or ironic comments or removing those passengers before attempting to reconcile the situation. Union leaders also recognize that the degree of tolerance of airlines employees towards passengers has decreased due to the increased level of employee stress.

In an April 2017 incident involving American Airlines, an airline employee was captured on video daring a passenger to hit him. That tussle broke out during boarding on an American flight from San Francisco to Dallas Fort Worth International Airport. Preceding the yelling match, a male flight attendant allegedly forcibly took a woman's stroller, nearly hitting her and her baby, then challenged a passenger who tried to intervene to hit him. “Try it. Hit me. Bring it on… You don’t know what the story is,” the flight attendant says on the video.

Also in April 2017, a paying passenger on a United Express flight, Dr. David Dao, was forcibly removed by aviation security at Chicago O'Hare Airport after refusing to follow the airline management's demand to give up his seat. The incident, like many of the others, was captured on video and went viral online.

An American pilot was accused of assaulting an employee of the same company at Guarulhos Airport in Brazil on March 7, 2018, according to the Federal Police, the exalted pilot went to speak with the official, who accidentally stepped on his foot, according to witnesses. He would have replied, "Do not touch me" and she replied that she had not leaned against him. According to the victim and witnesses, the pilot pushed her and grabbed her by the neck.

These cases have drawn media attention by the fact that one of the functions of the crew is to reduce the stress but currently they are increasing the pressure on board.

What is behind these collapses? Travelers and airline employees - particularly flight attendants and pilots – are under tremendous load of emotional stress, which increases...
every day. Working in aviation these days, especially on the front lines, is very exhausting.

The trigger factor could be external and internal stressors.

External Sources:
- Work conditions
- Environment (physical, chemical ...)
- Miscellaneous pressures
- Task performed
- Organization of work
- Work schedule
- Work shift
- Interpersonal relations ...

Internal Sources:
- Crew Member Health Status.
- Typical traits of personality.
- Breaking the biological routine.
- Ways to act and react.
- Depression, anxiety.
- Human Vulnerabilities (frustration, loneliness ...

What happens on the ground can affect what happens in the air, and vice versa. According to Headley (2010), representative of the Airline Quality Rating Report, airlines have not been managing the problem of Air Rage with effectiveness and certain employees sometimes might not be the right people for the job. Airlines require professionals with specific skills to deal with people taken by anger. Headley also says that these companies do not train their employees enough to operate on their respective jobs [7].

One of the contributing factors pointed out in the 2016 Cabin Safety Coffee Notes was that new flight attendant generation is much less tolerant than the older one. It’s important to develop a social-skill training that involves how to interact with people, problem solving and decision making (Association, Doc 10034, 2016) [1].

A. Smile! You’re on camera!

Any single incident recorded on a Smartphone camera is shared a million times on YouTube, Facebook or Twitter creating a global multiplier effect and raising people's awareness of a problem. Airline staff worry that viral videos of confrontations will not show all facts and may be misleading to the public. Content sharing has its positive side such as to defend social justice. However, posting things about misleading to the public. Content sharing has its positive side such as to defend social justice. However, posting things about

The investigated working sessions showed that the ATCs' subjective ratings correspond clearly to their cortisol response and the objective workload. Thus, ATCs' complaints regarding excess work stress should be taken seriously. For the present article, we have used some examples of air rage between pilots and flight controllers obtained through the Aviation Safety Reporting System (ASRS)

Narrative 1: [...] I’m not sure what to advise, other than to train FLM's to be more cautious and deliberate when inputting sector messages. This is not the first time this FLM has...
disregarded safety and the well-being of the operation in our area [9].

Narrative 1: [...]”This FLM's anger was also very distracting and uncomfortable, not a position I like to be put in when I am responsible for the safety of aircraft. Advisory Circular (ASRS, 2017) AC. No. 1426550. Date: 201702 [3].

Narrative 2: [...]I expressed my concerns to the tower chief a couple of years ago, but this guy has gotten worse. He has an attitude/anger problem that has no place in the safe operation of aircraft. I cannot possibly urge you strongly enough to remove this controller from SDF operations. I do not feel comfortable operating under his direction any longer. A final note: I can promise you I would not tolerate this guy yelling at me in person like he does while hiding behind his ATC microphone. I shouldn't have to put up with him in an airplane either. Advisory Circular (AC). No. 1286135. Date: 201508 [4].

Narrative 3: [...] The Controller's refused to talk to us; he didn't clear us anywhere outright or provide instructions for when we were done deviating, and his attitude and tone were hostile and angry, seemingly without provocation. I don't know if this report has adequately conveyed the bizarre nature of what happened and recall the Controller's exact phrase for washing his hands of us, but it was clear in context that that's what he was doing. Advisory Circular (AC). No 1002216. Date: 201203 [5].

These narratives show a deficiency in the use of communication skills as a socializing tool. It is important that controllers be assertive communicators in conflict situations and who know how to use techniques to reverse a communication that could compromise flight safety.

V. PREVENTION

In a study conducted by Rhoden (2007), communication was pointed as the best way to prevent Air Rage situations. Before the passenger has a violent reaction, there are many opportunities to re-establish communication in a significant way [15].

The comments of respondents suggested that training to contain aggressive passengers is limited to self-defense training and the use of the restraint system. The programs inform the cabin crew about the place of the restraint kit, instruct on the use of its contents (usually cuffs retention straps and plastic), including the amount of force to be applied and the risk of choking the passenger.

It is necessary that employees know how to differentiate when communication can improve or worsen situations. Vieira observes, “The biggest anger trigger is inadequate communication. Therefore, you must provide aircrew with training involving communication skills, so that the control of the situation is maintained” [16].

Flight attendants, pilots, controllers, airport agents and other staff need to develop individual communication skills to help them calmly discuss problems with angry people and avoid arguments or shouting. Moore (2003) argues that to deal effectively with conflicts, the intervener needs a conceptual road map or "conflict map" that details why a conflict is occurring, identifies barriers to the settlement, and indicates procedures to manage or resolve the conflict [12].

Although there is already a requirement for training in Corporate Resource Management (CRM) in airline companies, this training emphasizes teamwork, not individual competence. This problem can be solved as the individual recognizes their own strengths and limitations and strives to overcome their weaknesses and this ability to Manage Conflicts can be achieved through Conflict Risk Management Training. The ability to resolve conflicts is crucial to assessing and reducing the risk of violence within airports and aircraft without the need for physical intervention or the need to involve the law if necessary.

Social media and filming are facts of everyday life, so workers should be trained to deal with this situation without causing conflict. The training of Conflict Management should develop interpersonal communication and techniques that are essential for establishing and maintaining productive relationships necessary to successfully achieve the objectives of maintaining flight safety.

A. Basic format of Conflict Risk Management Training

Objective:

During the course, aviation staff will learn how to be aware of the conflict modes you may encounter, acquire skills to reduce conflict, develop appropriate skills for effective communication in conflict situations, and establish strategies for managing similar conflicts in the future. To develop skills for interpersonal communication, verbal, nonverbal as well as effective listening, adopting discursive styles that best benefit the productive relations necessary to Aviation Security, given the stressful nature of this relations, the rapid pace and the large amount of information that characterize the Aviation environment.

Course Content:

- Risk Assessment
- Self-Awareness
- Proactive Service Delivery
- Communication
- Signaling Non-Aggression
- Understand physical and emotional human responses during conflict
- Defusing & Calming
- High Risk Conflict
- Develop the ability to recognize the emotional tone of voice when speech comes from a stressed speaker
- Use voice correctly (volume, tone, pauses, clarity)
- Post Incident Considerations
- Action Plan
CONCLUSIONS

The present result of the programs to avoid Air Rage are pilots and crew inadequately trained in conflict resolution, who are unaware of a more effective language to persuade an uncooperative passenger to obey the safety instructions, or the recommended instructions to handle a drunk passenger. Communication quality can control or worsen conflict situations.

The aviation industry needs to recognize that effective communication improves social skills and helps calmly discuss problems with angry people and sidestep arguments or screaming matches.

Reducing communication mistakes by employees while interacting with passengers is a top priority to avoid air rage. Conflict Management is undeniably an indispensable skill to neutralize confrontational situations. Airlines employees agreed that the inclusion of Conflict Risk Management Training is vital for the best management of aggressive passengers. Problem-solving and conflict handling skills ensure cost reduction and safer flights.

It is not wise for airlines to maintain crew members and employees, who deal with passengers directly and take care of safety, under stress.

REFERENCES

Education and attachment: dropping out school failure

Rosa Maria de Castro
Departamento de Artes e Humanidades
Universidade Da Madeira
Funchal, Madeira (Portugal)
rose_psiwork@outlook.com

Dora Isabel Fialho Pereira PhD
Departamento de Artes e Humanidades
Universidade Da Madeira
Funchal, Madeira (Portugal)
dora.pereira@staff.uma.pt

Abstract—The Core role of this research work is to identify and reflect on explanatory factors of academic success at school. This study1 is being carried out with students attending an educational offer called "Alternative Curricular Course - PCA". It is a differentiated curriculum that promotes the learning of basic skills, specifically in Portuguese language and Mathematics, facilitating logical reasoning, artistic, vocational and professional development. Its main goal is the fulfillment of compulsory schooling and combat school failure. The purpose of this study is to analyze the following variables: dynamic internal models of attachment, teacher-student relationship and school performance in students with alternative curricular pathways. This is a cross-sectional and quantitative study, which will use the Scales IVIA - Inventory on Childhood and Adolescent Attachment and IPPA - Teacher Relation Scale, whose scientific validity will be enhanced by its application to a representative sample of public schools in Autonomous Region of Madeira (Portugal) with the aim of examining if the dynamic internal model and the teacher-student relationship influence school achievement. Data analysis will be performed through the SPSS program (version 23)

Keywords—alternative Curricular Pathways, dynamic internal models of attachment, teacher-student relationship, school performance, school dropout.

INTRODUCTION

In 2017, I had the opportunity of undergoing a professional experience in Madeira within the local school system concerning a particular public: youngsters risking dropping out. Confronting myself with that specific context and having to deal with multiple factors, realities and actors, has set the basis and main reasons for carrying out this research.

The Educational psychology lenses and more specifically the attachment theory, have thus fundamented the ground to explore that given reality.

In the current societies, accomplishing a high school diploma is an important developmental task tracing the transition from adolescence into adulthood (Arnett, 2000).

School completion is a major event in the academic, personal and professional life of an individual. Achieving school is the culmination of a process of learning, developing competencies and realizations. Whilst withdrawal stands for the negative opposite. (Gamier, Stein, and Jacobs, 1997). The dropping out factor represents a still significant percentage of students in Portugal and in Madeira specifically (Pordata, 2016). In fact, school dropout has drawn the attention of national policy makers, given that it is a development event, an element that can lead to severe social issues such as unemployment, substance abuse and eventually crime (Finn, 1989 Jimerson, 1999).

According to Sil (2004), the episodes of repetition and early abandonment of the educational system are situations that demonstrate how the academic failure of students is institutionally revealed, both episodes translating students’ maladaptation to the standards of the educational curricula.

According to data published in 2016 by the European Commission, the rate of school in Portugal ranks fourth withdrawal in comparison with other European countries considered (Pordata, 2016). This has triggered concern on the part of the various organizations and actors involved in the educational context in Portugal. Europe’s 2020 strategy sets the target of reducing the share of early leavers of education and training to less than 10%. In 2016, Portugal, rated 14% (Pordata, 2016), causing education decisors to develop emergency strategies to achieve European goal.

Benavente et al. (1994) and Sil (2004) argue that several dimensions should be considered in this analysis, such as cultural and family factors or the educational system itself. Academic success or failure occurs within the teaching-learning process and may reflect the impacts of innumerable internal or external aspects, such as personality, cognitive, emotional, teacher - student relationship, peer’s relationship, family structure and school as an institute among other aspects (Pereira, 2015).

At school, a comprehensive approach of tackling low educational accomplishment should include measures that are appropriate for all students, integrating underachieving students in specific; it should also comprise measures both inside and outside the “normal” classroom. Evidence shows that taking into consideration students’ educational needs in terms of willingness to learn, interest, and individual education profiles has a positive influence on engagement and accomplishment (Tieso, 2001, 2005; Lawrence-Brown, 2004).

Motivational aspects must also be taken into account. Teachers are required to set and encourage the involvement of all students (Hambrick, 2005). Teachers and staff dealing with juvenile publics, as well as significant adults in the lives of children / young people, can establish important connections (Bergin & Bergin, 2009; Riley, 2010), more specifically to those who suffered traumas during the developmental period, ending up without the right “tools” for the stage of schooling. Providing positive educational experiences to those children...
not only leads to improved learning and cognitive development but also to emotional, social and resilience growth (Bomber, 2007). For Bomber (2011), supportive practice and the quality of the relationship reinforces the successful education of all children, especially children who are socially and emotionally disadvantaged by early negative parenting experiences. In addition, teachers are increasingly familiar with students who demonstrate social, emotional and behavioural difficulties that ultimately impact their academic performance.

The implications of challenging student behaviour to teachers are an increasingly serious problem. Labels such as "at-risk," "vulnerable," "undisciplined " and "disruptive" (Bomber, 2011), are often heard in school meetings. In the specific case of the sample that will be used for this study, the above mentioned "tags" constitute for the students a stigma very well known.

The "Alternative Curricula Paths" (PCA) establishes a training program that provides alternative curricular responses adapted to the diversity of situation which have proven inadequate in regular education, when considering the dropping out learners. These curricula are designed to deal with and contribute to solving the problem of repetition and academic failure, avoiding the extension and replication of problematic cases. They are composed of a range of general and specific training subjects that enable the acquisition of knowledge and the promotion of skills in the technological, scientific, artistic and sports fields (Decreto-Lei n.º 3/2008, de 7 de Janeiro, art.º 18, ponto 1, p. 158).

This measure is intended for specific groups of school students, aged up to 15 years, who have the following requirements: a) repeated academic failure; b) discrimination; c) risk of social exclusion or dropping out of school; and d) high demotivation and abstention (Despacho Normativo n.º 1/2006).

Within a group of PCA, the task of the teacher/trainer, is multifaceted, requiring adaptive and creative skills to face challenges for more "unexpected" situations, creation of a positive learning environment and citizenship, as previously mentioned, since these classes are made up of students who experience school and social burden. In this same line of reasoning, it is considered relevant to support young people who are at risk, in the search for alternative training that enables them to lead a dignified life and to feel useful from a social perspective (Leite, 2009).

CONCEPTUAL DEFINITION OF ATTACHMENT

Lately the conceptual framework of attachment has attracted a more particular attention from researchers in the field of Pedagogy, making it possible to understand how relationships are established, what modifies and influences them, how they are expressed and to what repercussions they lead throughout life (Canavarro, 2006).

The attachment framework has been a very relevant referential for a view of the motivational processes that lead to non-collaboration and non-identification, as a consequent to school dropout (Finn 1989).

In addition, the attachment theory provides greater clarity to the significance and implications of the behaviour of students under emotional and social strain, thus empowering teachers as well as other educational actors to integrate them into the teaching strategies (Bomber, 2011).

The attachment relationship is defined as a deep emotional connection between the child and a significant figure, in which both opt for an attitude that contributes to physical and affective closeness in order to allow adequate development (Berman & Sperling, 1994) and tends to continue throughout life (Ainsworth, 1972; Bowlby, 1969).

Internal working models as the individual's representations about the self (encompassing the conceptions of personal and social competences), others (of their availability and support), and the world, are the result of the attachment experiences (Bowlby, 1969, 1988).

Through the formation of secure attachments with significant figure, children develop a healthy internal working model. Children with secure attachment improve the skills required to control their emotions and regulate their impulses (Grossmann et al., 2008). Contrarily those with insecure attachment have difficulties with emotional control and impulse regulation (van der Kolk & Fisler, 1994), acting on instant rewards at the cost of long-term goals (Gailliot, Mead, & Baumeister, 2008). This capacity definitely spawns impulse control and regulation, self-monitoring, and the skill of self-agency (Fonagy, Steele, Moran, Steele, & Higgitt, 1991a).

TEACHER-STUDENT RELATIONSHIP

Given the neuronal plasticity (adaptive capacities of the central nervous system to alter its own structural system and activity) of the brain, the child / youth is able to adapt in response to new experiences in the right environment, so there is ability for change (Gopnik, 2009, Greenfield, 2001). Children who have failed to secure bonds with their significant figures, may later develop significant ones with their teachers (Bomber, 2011).

Ultimately, Bowlby (1984), emphasizes the importance of creating an emotional, stable and irreplaceable attachment with a bonding figure, from which the child conceives knowledge and perspectives about himself, the caring figure, the others and the world. This link is thus a forerunner of later (dis) adaptive developmental scripts, in relation to the subject's new contexts and contacts (Cummings, Davies & Campbell, 2000).

Following Vygotsky studies (1978), Pianta (1999) points out that instruction happens in a relational context. On this wise, enabling the learning process along with the teacher, a student recognizes how to behave in a relationship and respond to teacher stimuli. In this perspective, the teaching is clearly bidirectional (Marcus, & Sanders-Reio, 2001).

The teacher-student relationship is one of the main features of the student’s learning process and may either act as a facilitator or as an obstacle. Some authors recommend that the improvement of relations between teachers and pupils can be a decisive and less costly course to optimize the success of
students (Lopes & Silva, 2010). The relationship between teacher and student can even play a significant role as a protective factor for young people experiencing school distress, family crises or at risk (Hamre & Pianta, 2005; Kennedy, 2008).

The quality of this attachment, along with the relationship with the caring figures, has been signaled as a determinant of the students’ academic success (Martin, Marsh, McInerney, Green & Dawson, 2007) for their adaptation to the school context (Baker, Grant & Morlock, 2008), for good management within the classroom (Riley, 2009) and for healthy peer relationships (Verschueren & Koomen, 2012).

The affective elements between teacher and student and their various consequences in the student’s life have been increasingly considered which helps the educational actors to begin to value this relationship as a significant element figure in the life of these future generations (Bombér, 2011). Rumberger's (1995), analysis of NELS data (National Educational Longitudinal Survey of 1988 USA) concludes that students who acknowledged that they had caring teachers were less inclined to drop out of school.

METHODOLOGY

RESEARCH QUESTIONS AND GOALS

The study to be developed will be non-experimental, cross-sectional and quantitative. We propose to characterize the relational dimension of this response and how it is associated with school performance, developing an investigation based on two constructs: the attachment and the teacher-student relationship. More specifically it is intended to:

1. Check if there are differences between the internal working model of the PCA students and regular education students;
2. Review the differences in the representations of teacher-student relationships between PCA students and regular education students;
3. Verify if the internal working model is related to the representations of teacher-student relations;
4. Analyze if the representations of teacher-student relationships are related to school performance;
5. Check if the internal working model and the representations of teacher-student relationships are related to school performance.

In the current research, we hypothesized: 1) that there are differences in the internal models of attachment between PCA students and students in regular education, 2) that secure attachment should be associated with better school performance rather unsecure attachment, 3) the higher quality representations of the student teacher relationship are associated with higher school performance, in PCA students and in regular students.

PROCEDURES

The accomplishment of the study implies, a few bureaucratic requirements: a) authorization of the Regional Director of Educational Administration b) the board subsequent authorization for the use of the instruments to the respective authors. c) meeting with the school’s boards where will be explained the objectives and the procedures and ask them to participate in the study. In a third stage, parents will be involved enabling the participation of their children.

Later, in the classrooms, students will be asked to engage in the application of the instruments. The objectives of the study will have been previously explained, highlighting its voluntary, anonymous and confidential nature.

Finally, after the application of the instruments, the collected data will be processed through the SPSS program.

INSTRUMENTS

Three instruments will be used:

I. Socio-demographic questionnaire (to be filled by the head of education or by the class tutors) that assesses age, gender, school performance, type of educational course (regular or PCA), promotion and protection measures applied in the previous school year and the geographic framework of the school (rural or urban). The operationalization of school performance in this study will correspond to the final grade for each subject in the last term of the previous school year.

II. Inventory on attachment in Childhood and Adolescence (IVIA), developed by Carvalho, Soares and Baptista (2006). It is a self-questionnaire and parental hetero-evaluation about a set of behaviours and representations about attachment in childhood. In this study, the self-assessment version will be used.

III. IPPA-R - Inventory of Parent and Peer Attachment, by Armsden and Greenberg, (1987), is a self-report instrument, validated for the Portuguese population by Machado and Figueiredo in 2010, which analyzes the perception of the quality of the relationship established between students and parents, peers and teachers. This study intends to evaluate the quality of teacher-student attachment.

SAMPLE

The sample consists of 8th graders students, (year of schooling attended by 38% of students in PCA) in the Autonomous Region of Madeira, in the 2017/18 academic year, divided into two groups:

1. PCA students' group: all classes of the 8th year of PCA, corresponding to 16 classes in 13 RAM schools, with a total of 204 students.
2. Group of students of Regular Education: 13 classes of the 8th year, one in each school with PCA, a total of 210 students.

In each school, a “regular education” group and a PCA group of 8th graders will be included, thus guaranteeing the homogeneity of the two groups regarding the geographical distribution of the students. The group of students in the regular education, will be randomly selected.
DISCUSSION

Based on the collected data, we will be analyzing how the internal working model of the young person and his perceptions regarding the teacher-student relationship are related to school performance in order to provide decision-makers and actors in the field with scientifically proven information regarding this relational dimension of the educational processes in Madeira (Portugal).

The knowledge of this correlation aims at empowering the schools, educational psychologists and teachers to plan and intervene more constructively and efficiently in the institutional and relational frameworks where teaching and learning take place.

This desired improvement can and should occur in terms of prevention, but in different contexts, and may become beneficial in remediation frameworks.

CONCLUSION

Having the responsibility to promote students’ knowledge, schools need to structure projects, based upon data and elaborate parameters that fulfill the European Community guidelines (Gadotti, 2000).

According to Kermis & Kermis (2010) and Kechagias (2011) employers are looking at a modern professional profile that implies dimensions beyond the technical or strictly scientific knowledge of the area considered. The so-called “soft skills” based on social competences, motivation, emotional intelligence and peer-to-peer relationship, seem to be a more significant part of the actual recruitment assets. School systems should no longer pretend that this change of paradigm has not yet occurred within the labour market.

The European Reference Framework (European Communities, 2012) recognizes the importance of social and emotional capacities demanded for personal fulfillment, social inclusion, proactive citizenship and employability in our knowledge-based community. Education has a basic role to play in ensuring that European citizens gain socio-emotional skills (Boyatzis, Goleman, & Rhee, 2000).

Accordingly, we can conclude that attachment is the basis for emotional regulation (Sroufe 1996, quoted by Vaz, Martins, & Martins, 2008). This is essential to take on challenges in school and professional contexts.

Bergin & Bergin (2009) and Rydell, Bohlin & Thorell (2005), show that a secure attachment has positive aftereffects on the lives of young people outside the family context, particularly at school, in the sense that it prepares and encourages them to explore the world and initiate new bonds of trust and resilience.

Attachment theory is a framework that may help, promoting psychological and social well-being and is the foundation of personality and socialization evolution (Bowlby, 1988). The emotional and social well-being of young people is relevant to educational success. Thence, educators, from preschool to higher education, can be more effective if they understand how attachment impacts the students’ learning processes (Bergin & Bergin, 2009).

School systems are able to make a difference when meeting with the educational goals and emotional needs of future citizens, supporting positive engagement in learning and social inclusion (Geddes, 2006).

Therefore, education and training policies in Europe are at the heart of future changes and they too must adapt.

REFERENCES

[18] Despacho Normativo n.º 1/2006, de 6 de Janeiro de 2006 - (Regulamenta a constituição de turmas com Percursos Curriculares Alternativos no âmbito do Ensino Básico)

Collaborative Learning: Leaders’ Selection Method and Team Performance

Dulce Pacheco  
Madeira Interactive Technologies Institute  
Funchal, Portugal  
dulce.pacheco@m-iti.org

Luísa Soares  
Madeira Interactive Technologies Institute / University of Madeira  
Funchal, Portugal  
lsoares@uma.pt

Abstract—Collaborative learning is a common approach in educational settings, but also in the industry, as it is an effective way to address complex tasks. The identification of the specific factors that boost team performance might have a significant impact on the job market. Group leadership has been shown to impact team performance, but the dimensions in which this happens are still unclear. To evaluate if the selection method of the group leader is related to the team performance, a study was conducted with a sample of 99 bachelor students divided by 17 teams collaborating in an 8-week long class project. The sub-scale Perceived Team Effectiveness (PTE) of the instrument Team Collaborator Evaluator (TCE) measured perceived team effectiveness. Group performance was also assessed by the final project grade given by the instructors. The perception of team effectiveness was higher in the groups which have unanimously selected their leader. These same individuals also got higher grades on their team project. Practical implications for the selection of group leaders are discussed.

Keywords—collaborative learning, learning team, leadership, selection method, team performance

I. INTRODUCTION

In educational settings, it is frequent to find students working in teams and learning from others [1]. Collaborative learning gives them the opportunity to experience cooperation, group decision making, team leadership, and team communication [2, 3, 4]. Those competences are highly sought-after in the job market [1]. Identifying the factors that boost team performance would improve team members’ satisfaction levels [1, 5], but it also has the potential to affect job placement, human resources selection, training, and retention [1]. Group leaders have a relevant role, but there is a lack of a clear theory connecting specific leadership dimensions to the mediators that shape and enhance performance outcomes [6, 7].

Leadership is leading an individual, group or organization to achieve specific goals [6]. It usually includes tasks like organizing, directing, coordinating, and motivating [8]. Leadership, like other social categories, has been shown to be dynamic, changing with the specific context in which leadership is rated [6, 9]. Rater’s bias makes it difficult to assess leadership effectiveness and to accurately interpret the effect of leadership on relevant outcomes [6]. Social-cognitive theory demonstrates that followers have implicit theories over the ideal leader behavior and central features [6]. Therefore, perceivers may automatically categorize leaders in terms of their implicit theories and then use the underlying structure of these categories to classify their leader [9]. Previous studies report that the better the fit between followers’ perceptions of their actual leader’s profile and their implicit leadership theories, the better is the quality of the leader-member exchange [10].

Team leadership is seen as the “ability to influence a group toward the achievement of a vision or set of goals” [8, p. 316]. Team leadership influences individual learning, team performance, and the perception of team collaboration [4, 5, 11, 12]. Leaders can be formally appointed or emerge from the group [8]. It has been shown that leadership is usually reserved for the most skilled and committed team player, accepted by all members [2, 4, 13].

Some authors consider that team leadership is not critical for effectiveness in collaborative learning teams, except when critical moments appear [2]. Others argue that the role of the leader is vital because they guide, monitor and frame group activities [4]. The group leader can help in the development of a shared understanding in a team, which is essential to set team goals, decide on strategies, allocate subtasks, monitor team processes adequately, and communicate effectively [14, 15].

Learning teams usually have a short lifecycle and can be defined as democratic, as a consequence of equally distributed expertise [2]. Consequently, leadership in learning teams will likely be a functional leadership, as the leaders’ responsibilities include ensuring a clear team direction, providing an enabling structure and context, coaching, and assuring adequate access to resources [16]. Functional leadership influences team performance through its effects on team cognitive, motivational, and affective processes and emergent states [17, 18]. Leadership has been shown to have a significant role in positively influence team member communication processes, team cohesion, and the degree of similarity and accuracy of team member mental models [2, 8, 19], which consequently influences team performance [6]. The leadership climate has been reported as positively related to team empowerment [20]. Team members who have better relationships with their leader are more likely to perceive the climate developed by their leader as positive [20]. Consequently, it is likely that leaders who do a better job empowering the team as a whole also do a better job empowering individual team members, and vice versa [20].

Learning teams are considered to be effective to the degree that learners achieve learning goals, as their superior aim is to learn while working on a problem, a project and/or task [2]. Nevertheless, especially in ad-hoc learning teams, there are reports of initially ineffectiveness because team members seem to lack the necessary information about each other’s competencies, what results in lack of mutual trust [2]. The social-constructivist paradigm, consistently used by collaborative learning researchers, postulates that collaborative learners should be implicated in the processes of knowledge construction in order to gain profound learning, understanding, and conceptual change, through discussion, debate, and argumentation [6].
We hypothesize that learning teams who unanimously choose the team leader report higher collaboration levels and achieve higher grades when compared to teams that use other selection methods.

II. METHOD

Subjects were 112 bachelor students that worked an 8-week long class project, in two mandatory courses, from two different majors of a University in Southern Europe. The study involved 59 students from the Computer Science major (CS) and 53 from the Psychology major (Psy).

A total of 99 students (response rate of 88%) agreed to take part in the study and fill in the questionnaires, whereas 46% were female and 54% were males, with the mean age of 21 years old. The sample had a similar number of students from both majors (49% CS and 51% Psy).

At the beginning of the semester (week 2), participants filled a paper-and-pencil survey that included sociodemographics questions (gender, age, major) and a question about the leaders’ selection method. Closer to the end of the semester (week 7), participants filled another paper-and-pencil survey to self-report perceived team effectiveness. As part of the team performance assessment, instructors grade students’ projects, at the end of the semester (week 8).

In the question about the group leader selection method, the options given to the respondents were: Self-volunteer, Elected by the majority of team members, Elected by all team members, Random choice, or Other methods. In this last case, it was asked the responders to specify which approach was used and students pointed out as Other method: “the first in alphabetic order”. Two teams reported that their leader self-volunteered, seven teams reported that the leader was elected by the majority of team members, five teams managed to unanimous choose the leader, in two groups it was a random pick, and the last team used a different approach (“the first in alphabetic order”).

Team performance was assessed by the sub-scale Perceived Team Effectiveness (PTE; 3 items, α=.89) of the Team Collaborator Evaluator (TCE) [2] and by the final project grade given by the instructors. PTE includes questions like “The extent to which you are satisfied about the quality of collaboration within your team.”, that were rated using a 1 to 10 scale, from 1=Low/Almost Never True to 10=High/Almost Always True. The final project grade given by the instructors was assessed on a 20-point scale, from 1=does not comply with any objective to 20=objectives achieved entirely.

In week 1, students freely chose their teammates with the condition to have at least four elements in each group. It resulted in a total of 17 teams, with a team size that ranged from 4 to 8 members (M=5.79, SD=1.89). Subjects received their team project assignment from the instructor also in week 1. In week 2, instructors asked groups to appoint a team leader. The designation of the team leader took place in week 2, so as to students get the opportunity to work together and to better know their teammates, team dynamics, and team work methods. Subjects did not know in advance that it would be asked to pick a team leader. Still in week 2, participants were asked to fill out a questionnaire with sociodemographic questions and to disclose the method used to appoint the leader. In week 7, participants filled out another paper-and-pencil survey with the sub-scale PTE. In week 8, instructors grade students’ projects.

III. RESULTS

A two-way-between-groups analysis of variance was conducted to explore the connection between the method used to select the team leader and, both PTE and the final project grade, accounting for the major (CS and Psy).

Linking the leaders’ selection method to the PTE was uncovered a main effect $F(4,79)=6.17$, $p<.01$, with an effect size ($η^2=.24$). Post-hoc comparisons using the Tukey HSD test showed that the mean score for the leaders’ selection method “Elected by all team members” ($M=8.77$, $SD=1.09$) was superior (Mean differences=1.04, $p<.01$) to the selection method “Elected by the majority of team members” ($M=7.73$, $SD=1.25$). The relationship between PTE and the remaining leaders’ selection methods, namely Self-volunteer ($M=7.73$, $SD=0.76$), Random choice ($M=7.42$, $SD=1.75$), and Other methods ($M=6.83$, $SD=0.71$), did not meet the 95% confidence threshold.

A correlation between the leaders’ selection method and the final project grade was established and revealed an interaction effect $F(3,79)=6.1$, $p<.01$ with an effect size ($η^2=.19$). Still linking these two variables was disclosed a main effect $F(4,79)=4.01$, $p<.01$, with effect size ($η^2=.17$). Post-hoc comparisons using the Tukey HSD test indicated that the mean score for the selection method “Elected by all team members” ($M=17.86$, $SD=1.48$) was superior (Mean difference=1.19, $SD=0.35$, $p<.01$) to the selection method “Elected by the majority of team members” ($M=16.67$, $SD=1.93$). The liaisons between the final project grade and the selection methods Self-volunteer ($M=16.67$, $SD=1.93$), Random choice ($M=17.25$, $SD=0.50$), and Other methods ($M=17.50$, $SD=0.71$) were statistically non-significant.

IV. DISCUSSION

Learning teams are conveyed to establish a functional leadership, where the leader will likely ensure that the team has a clear direction, provide an enabling structure and context, coach the team members, and assure adequate access to resources [16]. Such leadership is reported to influence team performance through its effects on team cognitive, motivational, and affective processes and emergent states [17, 18].

Our study shows that teams which leaders were unanimously elected perceived their team effectiveness on a higher level, but also achieved higher project grades. It confirm claims that leadership is usually reserved for the most skilled and committed team player, accepted by all team members [2, 5, 13]. Whereas, group leaders that were not accepted by all team members (i.e., leaders elected by the majority of team members, self-volunteered, randomly chosen, and other selection methods) might have experienced more leadership challenges, higher team conflict levels, and less mutual trust. These factors, as reported in the literature [2], can be translated into lower team performance. Furthermore, leaders that were unanimously elected might be more prone to establish better communication patterns, democratically led the team, and reinforce cohesion which has a positive effect on team performance [2, 6, 8, 19].
In our study, teams with higher performance clearly agree on the individual that was elected as leader. This fact might have created a positive ambiance that made the team members easily respect the leader’s authority, conform with his/her decisions, commit to the success of group discussions, and just direct their focus on the task. The favorable leadership climate might have conducted the team to a better-perceived team effectiveness and, consequently, better team performance. It confirms previous findings that positively correlate leadership climate to team empowerment [20] and the good relationship members-leader to positive perceptions of the leadership climate [20]. The unanimous election of the leader might mean that team members recognized right from the start, within their team, an individual that complies with their implicit theories over leaders’ behavior and central features, making it easier for the leader to fulfill followers’ expectations and act according to his/her authority.

The positive leadership climate that might have been created within the teams that unanimously have chosen their leaders may have facilitated the development of a shared understanding. According to the literature, the shared understanding is essential to support the process of setting team goals, deciding on strategies, allocating subtasks, adequately monitoring team processes, and communicating effectively [14, 15]. All these factors ease team dynamics, individual performance, and team performance.

Teams with leaders unanimously elected reported higher perceived team effectiveness. Positive perception over team performance have shown to increase all team members’ satisfaction levels [1, 5] which, in returned, might have enhanced team effort, commitment and, finally, boost performance. Our study seems to confirm that team leadership may influence team performance and, consequently, individual learning and the perception of team effectiveness, corroborating previous findings [4, 5, 11, 12].

Educators working with collaborative learning teams should consider the outcome of our study and encourage teams to select their leaders’ unanimously, as it might augment team members satisfaction, perceived team effectiveness, and team performance. Companies and other organizational units can also learn from our findings and support their teams in the process to unanimously appoint group leaders, as it may guarantee them higher individual and team achievements.

V. CONCLUSION

Group leadership is one of the features that influences team performance. Though, the dimensions in which this takes place are vague. Identifying the factors that boost team performance should impact human resources management policies, but also other policies and selection methods (e.g., policies for college admission). In our study, the method used to select the group leader showed to predicted higher perceived team effectiveness and higher team performance.

Data show that, when comparing the selection methods of the group leaders, the approach that guarantees higher performances is through a unanimous decision of the team members. This selection method appears to be related to a higher perception of team effectiveness and higher performance evaluation.

The select method elected by the majority of the team members proved to originate inferior team scores when compared to teams with leaders that have been unanimously chosen. The results from the teams were the leader was a self-volunteer, picked randomly, or selected by other methods showed not to meet the expected statistical significance of 95%.

Team members should be encouraged to select their leader unanimously, as it could predict higher satisfaction and group performance.

Authors identify some limitations on the work like the small size of the sample (99 students that were divided by 17 teams), from one unique university. When data was collected, the instrument used to assess the perceived team effectiveness (PTE) was not validated to the Portuguese student population. Despite this fact, it has revealed high validity. Results should be read, interpreted, and generalized taking into consideration these constraints.

This study was a first approach to explore the relationship between group leaders’ selection methods and team performance. Further research should further investigate this connection, controlling for other factors as leadership styles, leaders’ individual characteristics, and team dynamics. Students’ academic records can be considered, as they should aid in the measure of cognitive abilities and past performances.

ACKNOWLEDGMENT

This work is supported by the Fundação para a Ciência e Tecnologia (Projeto Estratégico – LAGUID/E/EEA/50009/2013) and by Regional Development European Funds, for the Operational Program “Madeira 14-20” (M1420-01-0145-FEDER-000002).

REFERENCES


Evolution of Cultural Intelligence in Students Working in Multi-national Teams: A Case-Study

Dulce Pacheco
Madeira Interactive Technologies Institute
Funchal, Portugal
dulce.pacheco@miti.org

Scott M. Stevens
Carnegie Mellon University
Pittsburgh, PA, USA
scottstevens@cmu.edu

Abstract—The number of individuals from different cultural backgrounds that work together has increased in the last years and it is expected to keep growing. Cultural differences in the workplace correlate to poor task performance and may lead to conflicts. The abilities to best interact in a multi-cultural context are still unclear, but researchers argue that being comfortable in multi-cultural environments requires more than just cognitive intelligence. Individuals who live or work in other cultures seem to gain knowledge that can further affect their behaviors and facilitate their interactions in multi-cultural settings. We theorize that individuals working together in multi-national teams, even for a short period, may experience a change in their cultural intelligence. Using a Pre- and Post-test design, we examined 69 graduate students. Subjects worked together in a project-based class for one semester (15 weeks). Cultural intelligence was measured by the Cultural Intelligence Scale (CQS). Results indicate that individuals’ cultural intelligence grow 7.2% over the period of one semester. The cultural intelligence facets metacognitive, cognitive, and motivational presented significant increases as well. The outcomes of this study can be used in the training of individuals that need to act in culturally diverse environments. Possible directions for further research are discussed.

Keywords—cultural intelligence, intergroup relations, multi-cultural, multi-national, team

I. INTRODUCTION

The number of individuals working or studying in international settings is increasing and this growth is expected to continue [1]. Nevertheless, these experiences are frequently classified as unsuccessful [1, 2, 3]. Cooperation between individuals from different backgrounds has been proven necessary to address the complex tasks demanded by the job market [4, 5]. However, cultural differences in the workplace seem to be correlated to poor task performance [6] and may lead to conflicts [7, 8, 9]. Members of multi-cultural teams hold diverse cultural identities, affecting their understanding, interpretation, and behavior [9, 10, 11]. Research indicates that cultural values play a critical role in human behavior in organizations [6], as those values influence both role expectations and perceptions of role expectations [12, 13].

Individuals who operate in multi-cultural contexts are expected to develop shared common meanings, values, and codes of behaviors to effectively communicate with each other and coordinate their activities [14]. It has been shown that individuals who live or work in different cultures gain knowledge that can further affect their attitudes and behaviors [15, 16, 17]. However, the abilities to best interact in a multi-cultural context are still unclear [18].

The concept of cultural intelligence (CQ) emerged because researchers believe that being comfortable in multi-cultural environments requires more than just cognitive intelligence [18]. CQ is defined as an individual’s capability to function and manage effectively in culturally diverse settings [19]. Individuals with high CQ have a set of mental (metacognitive and cognitive), behavioral, and motivational abilities that allow them to work effectively with persons from diverse cultures and adapt to foreign environments [19, 20]. These individuals are considered to be culturally competent [18].

A. The Multidimensional Concept of CQ

CQ is conceptualized by Ang and van Dyne [19] as a four-dimensional construct: two mental facets (metacognitive and cognitive), along with the motivational and behavioral facets of CQ [19].

Metacognitive CQ is defined as a person’s mental processing in order to gain awareness and understanding of the appropriate ways of a different culture [12, 21]. Those high on metacognitive CQ are consciously aware and mindful of cultural preferences and norms [22]. Additionally, individuals with a higher metacognitive CQ always question cultural assumptions and adjust their mental models to find the preferred one [21].

Cognitive CQ focuses on knowledge of norms, practices, and conventions in different cultural settings [12]. Individuals high on cognitive CQ have better cognitive-processing capabilities in a new cultural setting and can incorporate further information to understand and interpret new experiences [21]. Moreover, they can anticipate and understand similarities and differences across cultures [22] and understand better their own role and their role expectations [12, 13].

Motivational CQ is the capability to direct attention and energy toward learning about, practicing and functioning in culturally different situations [6]. Those high in motivational CQ experience intrinsic satisfaction when acting in multi-cultural environments and are confident about their ability to function in these settings [22]. Those individuals tend to have a stronger desire to accept challenges in a new environment and a greater will to tolerate frustration, what consequently leads to better adaptability [21].

Finally, behavioral CQ is the capability to exhibit situationally appropriate actions from a broad repertoire of verbal and non-verbal behaviors [12]. An individual with a higher behavioral CQ gains more natural acceptance by the associated group, which helps him/her to develop better interpersonal relationships [21].

Previous studies on multi-cultural settings have established a positive relationship between CQ and...
adjustment/adaptation to new contexts [e.g., 12, 20, 23] and between CQ and job performance/effectiveness [e.g., 12, 21, 23, 24]. It has been shown that CQ aids leaders to enhance their teams’ performances [11, 25] and that CQ also helps integration in overseas contexts [26].

B. Development of CQ

Conceptual and empirical work on multidimensional CQ suggests that CQ dimensions are capabilities that can be developed, correlating this growth to environmental and individual factors [17]. Travelers that cross international borders gain a cultural experience that seems to guarantee them more opportunities to acquire and cultivate metacognitive strategies and interaction models, such as greater cultural sensitivities to and awareness of cultural differences and norms [15, 16, 17]. Individuals high on metacognitive CQ are more conscious and mindful of environmental changes, including cultures in different travel destinations [17, 22]. Yet, more cultural experiences may not translate into higher awareness during intercultural interactions [17], as the negative physical and psychological impact of the trip may prevent travelers from processing and adapting those cultural experiences at a deeper level [17].

Research shows that short-term trips increase the knowledge of specific cultural environments and develop the cognitive aspect of CQ [17]. Individuals high on cognitive CQ have more stored cultural information [17]. Higher exposure to international experiences should build travelers’ confidence in their ability to function in different cultures [15, 17, 26], that is, enhance motivational CQ. Individuals with high motivational CQ are interested in learning about effective interactions at different destinations [17, 22, 26, 27].

The contact with multi-cultural environments should also expose travelers to wider repertoires and deeper understanding of behavioral norms [17]. Individuals high on behavior CQ may consciously monitor and adjust their verbal and nonverbal behaviors to align them with the cultural expectations of the locals [17]. Yet, knowledge of the acceptable behaviors does not necessarily translate into actual behavior [17], as individuals tend to slowly change their comportment, learning from their social interactions [15, 16, 17, 29]. Particularly in short trips, travelers may not have adequate opportunities to practice and develop verbal and nonverbal repertoires of acceptable behaviors [17].

Previous findings postulate that training courses may enhance individuals’ CQ so that they become more willing to learn and face cultural challenges, as that might make them achieve higher performances [24, 27, 31]. Some authors report that cultural training is most effective a) when it is designed to be relative to specific individuals in a specific context; b) when it is begun prior to the trainees’ departure from their home culture; and c) continues periodically during their stay in the host country [20]. Whereas, others claim that training should happen with a well-structured program that has: a) clear organizational support; b) close contact with individuals from a specific culture different from one’s own for a highly concentrated period of time of at least a one to two weeks duration; c) very high frequency of contact and communication (near constant contact during the program duration) with the targeted cultural group; d) equal status of both groups of participants (trainee and targeted cultural group); and e) clear and meaningful goals in which there is mutual dependence between both the trainee and targeted cultural groups. Even though that training seems to enhance CQ, most individuals do not get through it before traveling [17].

The contact hypothesis proposed by Allport [28] suggest that the increased contact with a specific context would improve inter-group relationships. According to Social Learning Theory [29], individuals learn new behaviors through attention, retention, and reproduction. Moreover, Social Learning Theory claims that this learning integrates both cognitive and behavioral processes and is influenced by motivation and consequences [29]. Therefore, for an individual to learn appropriate behaviors to live and work in a country, they need to observe natives’ behaviors and have the opportunity to reproduce them in the environment [18].

Research shows that CQ increases in short-term (7 to 12 days) structured international experiences, with pre-trip training [27] and without pre-trip training [17]. Yet, a limitation of these studies, as some authors report [27], is that this growth might be explained by what has been labeled as the honeymoon phase of cultural adaptation to a foreign culture. This typically occurs in the very early arrival period of a subject to a foreign country [27]. Findings also claim that CQ also increases in longer exposures (6 months) with pre-trip preparation [31]. Still, it is not clear if this growth would also be significant in a non-structured exposure, without pre-trip training.

C. CQ in multi-national educational settings

Authors [18] report that CQ has been perceived as an important skill set for graduates in the current globalized environment. Multi-cultural environments are also present in academia, as some programs present a mix of students from all over the globe. The concept of creative chaos firstly appears at academia, to characterize a specific dynamic process of collaborative design and development [30], where students from different disciplines and different cultures work together for one semester (15 weeks) in the development of an innovative product. Creative chaos is seen as the term to “try and encapsulate the creative production process, which is often full of ambiguous ideas about what you are trying to actually make” [30, p. 14]. This process is chaotic as individuals, working in interdisciplinary and multi-national teams, need to iterate their way toward a good design that also meets the goals of the project [30].

We designed a study to investigate if having a non-structured experience in a multi-national team for a short period (15 weeks) would change the self-reported cultural intelligence of its team members. Previous studies about the evolution of CQ have been made with: short exposure (up to 1 month) without pre-trip training [17]; short exposure (up to 12 days) with pre-trip training [27]; longer exposure (6 months) with pre-trip training [31]. To the best of our knowledge, this was the first time that CQ has been investigated in individuals operating in multi-national teams in a 15 weeks period.

II. METHOD

Subjects in this study were 85 college graduate students in a disciplinary diverse graduate program, with the duration of two years, in a Northeastern US university, in Spring 2017. Participants worked in teams, in a project-based class, for one semester. Teams in this study went through a specific dynamic
process of collaborative design and development, the creative chaos [30].

A total of 69 students agreed to voluntarily take part in the study (81% response rate). Nine questionnaires were incomplete, hence were excluded from the data analysis. Participants had gender equality (51% females and 49% males) and the mean age of 25 years old (age range 21-42). Responders come from China (42.4%), US (31.8%), India (12.1%), South Korea (4.6%), Taiwan (3.1%), Great Britain (1.5%), Israel (1.5%), Malaysia (1.5%), and Singapore (1.5%).

Cultural Intelligence Scale (CQS) [12] measured CQ (Pre-test: N=60, \( \alpha=7.8 \); Post-test: N=34, \( \alpha=8.4 \)). CQS is a self-reported 20-item instrument with questions like “I adjust my cultural knowledge as I interact with people from a culture that is unfamiliar to me.”, “I know the rules for expressing non-verbal behaviors in other cultures.”, “I am confident that I can socialize with locals in a culture that is unfamiliar to me.”, and “I use pause and silence differently to suit different cross-cultural situations.”. CQS uses a seven-point scale ranging from 1=strongly disagree to 7=strongly agree. CQS comprises four sub-scales to measure the four-dimensions of CQ: Strategy (metacognitive facet of CQ: 4 items, \( \alpha=7.0 \)); Knowledge (cognitive facet of CQ: 6 items, \( \alpha=6.3 \)); Motivation (motivational facet of CQ: 5 items, \( \alpha=7.3 \)); and Behavior (behavioral facet of CQ: 5 items, \( \alpha=7.3 \)).

This study was designed as a quasi-experiment with Pre- and Post-test. Participants were assigned to groups by their faculty members. The assignment process attains to build disciplinary and culturally diverse teams, as it has been reported that when developing innovative artifacts, heterogeneous teams perform better [30].

Subjects firstly received an email with an invitation to participate in the study. Those that agreed to take part received an email with the first questionnaire at the beginning of the semester (Pre-test) and another questionnaire at the end of the semester (Post-test). Both questionnaires included the instrument CQS (20 items). The first survey also included demographic questions (age, gender, and country of origin).

III. RESULTS AND DISCUSSION

CQ presented a 7.2% growth (Pre-test global M=5.1; Post-test global M=5.39) over 15 weeks (Fig. 1). This result confirms previous findings that describe CQ dimensions as capabilities that can be developed and that can increase over time [17, 18, 20, 27, 31]. This is consistent with Bandura’s Social Learning Theory [29] and reports that individuals who live or work in other cultures gain knowledge that can further affect their understanding, attitudes, and behaviors [e.g., 12, 15, 16, 17, 25, 27]. Individuals who operate in multi-cultural contexts are expected to develop with their teammates shared common meanings, values, and codes of behaviors in order to effectively communicate with each other and coordinate their activities [12, 13, 14, 25]. They should achieve a better understanding of their own role [6, 12, 13], superior adaptation to the multicultural setting [19, 20], and that may lead to more effective work [19, 20]. Interactions within multicultural teams seem to enhance individual cultural competency, which is consistent with the contact hypothesis [28].
Our data show that metacognitive CQ increased over the period of 15 weeks (Table I), which confirms past findings, even though these had different time exposures [17, 27, 31]. Our study did not include pre-trip training, what might explain a more conservative growth rate in the metacognitive when compared to other studies [27, 31].

Research shows that short-term trips tend to increase the knowledge of specific cultural environments and develop the cognitive aspect of CQ [17, 18, 27, 31]. Our study corroborates this claim, as the knowledge CQ is higher in the Post-test, that is, after a short-period exposure to a multi-national team environment (Table I).

Motivational CQ was higher at the end of the semester (Table I), confirming previous findings that reported that exposure to multi-cultural settings raises confidence in the ability to function in different cultures [15, 17, 26], and boost their stimulus to learn about effective interactions on those contexts [17, 22, 26, 27, 31].

Behavior CQ is the sub-scale that presents a lower level and a lower growth rate (Table I). Social Learning Theory researchers help to explain this lower growth as they argue that through social interactions individuals become aware of the behavioral norms, while their comportment tends to change at a slower pace, especially when compared to cognitive change [15, 16, 17, 29]. Literature is inconsistent when reporting the evolution of behavioral CQ, as some authors found that short-term travelers often do not have adequate opportunities to practice and develop verbal and nonverbal repertoires of acceptable behaviors [17], whereas others claim that short-term trip (7 to 12 days) or longer trips (6 months) are enough to change behavior and increase behavioral CQ [27, 31]. Our study showed that CQ grows in a 15 weeks period, but not in a significant level, which does not confirm Engle and Crowne [27] results. This might be explained by the fact that, contrary to other works [24, 27], in our study participants did not go through previous training, or by the honeymoon phase that might have positively biased Engle and Crowne’s study, which the authors identify as a limitation [27]. Moreover, our sample included individuals from nine different countries, with their own cultural identities, which might have made it harder for participants to behave accordingly to these multiple cultural differences.

**IV. CONCLUSION AND LIMITATIONS**

The present study makes a valuable contribution to the body of research on multi-cultural effectiveness in working teams. It also contributes to the understanding of the evolution of cultural intelligence. First, it shows that exposure to multi-national settings, even for a short period (15 weeks) and without pre-trip training, enhances cultural intelligence, in its metacognitive, cognitive, and motivational facets. Thus, it can further predict a better adaptation to culturally diverse environments.

Second, it indicates that, even though individuals increase their cognitive CQ within 15 weeks of exposure to a multi-national context, behavioral change seems to take more time to be effective.

Last, this study offers important implications for practice, both for practicing managers and multi-national companies, as it suggests that operating in multi-national teams improves the understanding of the cultural differences and enhances the ability to work more effectively on those environments.

Although the present study provides valuable insights into an understanding of the extended literature on cultural intelligence and examines if the exposure to multi-national environments enhances cultural intelligence, a key limitation is that the sample was comprised of university students, therefore it may not be generalizable to non-student populations. Still, as a study of Cultural Intelligence in diverse academic teams, we believe this work has significant applicability to a wide range of educational settings and is suggestive of diverse teams in general.

Further research should consider including pre-trip training when investigating the effects of CQ after the exposure to multi-national teams during a short period (15 weeks, for instance). It could also consider measuring CQ in different points of the exposure (e.g., before training, right after training, at the arrival to the multi-national setting, two weeks after the arrival, and 15 weeks after the exposure). These additional efforts will further confirm the validity and generalizability of the findings of the current study.

**ACKNOWLEDGMENT**

Special thanks to Prof. Drew Davidson from ETC – Carnegie Mellon University for his help and support to the project. We would like to acknowledge the aid of Prof. Laurie Weingart, Prof. Kenneth Goh, Prof. Gergana Todorova, and the PhD Candidate Anna Mayo when designing the study and collecting the data.

This work is supported by the Portuguese Science and Technology Foundation (Projecto Estratégico – LA9 UID/EEA/50009/2013), by the Carnegie Mellon Portugal partnership (scholarship 3368/BM0B/16), and by Regional Development European Funds, for the Operational Program “Madeira 14-20” (M1420-01-0145-FEDER-000002).

**REFERENCES**


Authors’ Index

Antónia Gonçalves M. 7
Bermúdez I Badia S. 1
Brito M. 7
Carneiro P. 7
Castro R. 32
Isabel Pereira D. 32
Lobo F. 12
Lúcia Faria A. 1
Luísa Ramos A. 7
Maria Vieira A. 27
Pacheco D. 38,52
Pinto V. 7
Soares L. 38
Stevens S. 42
Teresa Pereira M. 7
van den Broek K. 22