

## SENSITIZING ADOLESCENTS FOR FUTURE SAFE AND SUSTAINABLE BEHAVIORS: THINK SAFETY PROJECT!

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### ABSTRACT

Everlasting mentality shift must begin at tender ages, using methods and techniques that allow adolescents to make connections with everyday life contents and situations. Think Safety Project! (TSP) is directed at adolescents, with ages between 13 and 17 years old, their teachers, tutors and parents. It aims to raise awareness on: i) early risk detection and prevention; ii) the importance of the adoption of safe behaviors. TSP is based on project-based learning, and the foundations for activity design and adult interaction, were: a) Promoting experiences with pedagogical and practical objectives; b) Functioning has a role model by observation and promotion of self-opinion; c) Create settings that allow adolescents to question, to think and to experiment; d) Create settings that allow adolescents to experience safety in simulated and similar to real environments; e) Promote autonomy; f) Sensitize adolescents for technical careers related with industry; g) Sensitize adolescents, teachers, tutors and parents for the importance of the promotion of a safety culture; h) Give knowledge of different real industrial settings concerning safety, risk analyses and safe behaviors.

The activities also allow adolescents to: a) Give new meanings to reality; b) Develop and test new ideas; c) Rationalize impacts of their behaviors in either real or simulated settings; d) Promote global awareness on the importance of safe behavior adoption, and their impacts on society, industries and citizens; e) Promote global awareness of industrial processes and the importance of the human factor; f) Take on safety habits (own and within their families).

Has the outputs of the project it will be explored the initial and final perceptions concerning behavioral assets of health and safety in society and at work/industrial settings. Some of the questions that we intent to answer during the project are: Can perceptions be altered? What are safe behaviors? What's the role of safety in everyday life? Why have safe behaviors?

**Keywords:** Safety, Sustainable behaviors, Behavioral change, Adolescents

### 1. INTRODUCTION

The idea and the perception that adolescents (their families, teachers and tutors) have about issues related to risk detection, prevention and the importance of the adoption of safe behaviors' related to future jobs and present daily behaviors' is not sufficiently clear (RAEng, 2007, Halstead et. al, 2009; Kupfer, 2011). According to previous studies adolescents tend to choose "easier" paths and careers with another public image and recognition (Fernandes and Rocha, 2010). Various researchers have studied students' attitudes towards "industry", "science" and "technology". Researches shown that adolescents often have stereotypical images and that those images affect their attitudes toward science, industry and technology (Berdslee and O'Dowd, 1961; Brush, 1979; Chambers, 1983; Fernandes and Rocha, 2007; Finson et al., 1995; Flick, 1990; Mason et al., 1991; Mead and Metraux, 1957;

Palmer, 1997). It appears that if a adolescent can see himself/herself in a career, then, the likelihood of that person pursuing an educational program to prepare him/her to that career increases (Smith and Erb, 1986).

These documented diminished interest in engineering, industry and industrial related careers has been long associated with several factors such has: perceptions and images of industry, lack of knowledge, lack of understanding the contribution of engineering for everyday life, teaching methods, curricula, mismatch between values and the way technical subjects are approached, career guidance, adolescents lack of understanding and appreciation for their potential future role in society (Berner, 2010; Cavallo & Laubach, 2001; Fernandes and Rocha, 2010; Moor et al., 2006; Osborne and Collins, 2001; Roberts, 2002; Wyncarczyk & Hale, 2008).

“Young people need to see the point of it all. They especially want practical application (not just practical work). This might be learning about a job, developing personal skills, experiencing team work or having a subject explained to them in terms of its contemporary context” (Lord, 2006, p. 2). Adolescents need these divergent approaches to learning versus the majority of schools curriculum approaches. It’s unquestionable that lifelong learning and development, with all the associated (individual) strategies are central issues for the development of a capable workforce and a productive healthy country.

## 2. THINK SAFETY PROJECT!

TSP is program designed for the Portuguese reality that encompasses adolescent’s students with ages from 13 to 17 years old. It is based on previously developed, experience and validated models. CATIM has running similar projects since 1995 (Fernandes and Rocha, 2011, 2007) and more than 20.000 adolescents were evolved in sensitizing programs just in this Technological Center.

TSP is a multilevel, multidisciplinary and transdisciplinary project, so as a consequence it encompasses several different stakeholders such as: adolescents, general citizen, parents, Technological Centers Network, Industrial companies, Universities, Polytechnics and Research Institutes, Industry and Professional bodies, National and Government Agencies.

The main objectives for TSP are: i) to raise awareness on early risk detection and prevention; ii) transmit the importance of the adoption of safe behaviors to develop a positive mind-set among young people. In table 1 we present the main problem dimensions, specific targets and general objective for TSP.

*Table 1: Main problem dimensions, specific targets and general objective for TSP*

Main Problem Dimensions	Specific Targets	General objective
Traditional image for the industry with a large number of accidents	<ul style="list-style-type: none"> <li>• Develop a positive vision of industry</li> <li>• To link industry with positive values and attractive careers</li> </ul>	To develop a positive vision of industry and of employment opportunities and technical careers in the industrial sector. Safety at work as a career.
Withdraw between adolescents in school ages and industrial activities and careers related to a old and bad image.	<ul style="list-style-type: none"> <li>• To make adolescents and industry closer (and vice-versa)</li> <li>• Evolve adolescents and industry in a mutual approximation processes</li> </ul>	

### 2.1 Strategy

A growing body of literature suggests that variations across countries, in entrepreneurial activity and the spatial structure of economies could potentially be the source of different efficiencies in knowledge spillovers, and ultimately in economic growth. These context lead to the need and desire for designing programs for children and young adults, to make the best of time-out-of-school (and in-school) for contributing positively towards a productive and conscientious adulthood (either at work or in society). The youth of today will be the working force and the active citizens of tomorrow.

Over the past 20/30 years “scientific literacy” is one of the goals for science education worldwide (in and out of school). The proofs of it are the several educational reports, networks and projects on the subject. Initiatives like TSP also intent to promote global awareness of industrial processes and the importance of the human factor, and trends and its links with everyday life contexts.

Everyone must have in mind that through an adequate formal interaction with adults’, adolescents (with different ages) may develop important scientific skills (Martins and Veiga, 2001), attain vocational identity development (Taveira and Moreno, 2003), develop alternative visions of the reality and increase levels of “industrial literacy”. According to Johnston and Gray (1999) the interaction with adults and other adolescents may:

1. Promote experiences with a specific focus or learning objectives;
2. Function as a role model by observing and expressing ideas themselves;
3. Create an opportunity for asking questions to challenge thinking or develop the experience further;
4. Act as motivation for students to express their ideas and look for other extended, similar or new experiences.

The authors argue that these interactions, specially the one based on TSP activities, also allow adolescents to:

1. Give new meanings to reality;
2. Develop and test (re)new(ed) ideas;
3. Rationalize impacts of their behaviors in either real or simulated settings;
4. Promote global awareness on the importance of safe behavior adoption, and their impacts on society, industries an citizens;
5. Promote global awareness of industrial processes and the importance of the human factor;
6. Take on safety habits (own and within their families and everyday life).

The main objectives for TSP are i) to develop a positive vision of the industry and of employment opportunities along with technical careers in the industrial sector towards a sustainable and active citizenship; ii) To develop a positive vision of industry and of employment opportunities and technical careers in the industrial sector towards an active citizenship.

TSP is also designed to show adolescents new ways of learning, working and living in society e.g. using e-learning and Communities of Practice (Fernandes and Rocha, 2007; Fernandes and Rocha 2006 a, b; Rocha and Fernandes, 2006), using project approaches to solve everyday problems (Rocha et al., 2013). There are several activities designed to foster innovative thought development and promoting entrepreneurship and industrial property rights.

## **2.2 TSP Activities**

TSP activities are clustered into three vectors: 1) Laboratory of Industrial Technologies (Lab IT), 2) “The walnut shell story”, 3) multimedia presentations. Each of these vectors has its own strategy to achieve the project objectives. The activities developed under the TSP scope, generally tent to promote the understanding of different settings of the labor environment, in particular the industrial sector, that gives a snapshot about its representation in terms of risk analysis and safety actions; and “technology laboratories” that corresponds to the use of equipment’s related to the individual safety devices in the industrial activity and the underneath technologies applied in several industrial processes such as sensors, software, among others.

Lab IT’ activities are designed for groups of approximately 15 to 20 students from the formal teaching system that come to CATIMs’ facilities, for each session (duration of 90 to 120 minutes). The activities are a blended of verbal presentation supported with some attractive multimedia and interaction moments, to field trips and to laboratorial activities encompassing several hands-on with Personal Protective Equipment (PPE) such as helmets, gloves, boots, glasses, and project approaches in solving “everyday industrial problems”.

The hands-on activities for most of the participants are a fun and relaxing moment, is the first time that the majority of the adolescents try and use this kind of equipment, and they laugh together and take a lot of pictures.



Figure 1 – Adolescents experiencing PPE

Due to the activity pack’ design it can be delivered in regular schools, in technological centers’, industrial facilities or others. Although the results are not quit the same, the development context (e.g. school, industrial setting, training room, technological center) influence the output and the adolescents way of experiencing the activities. Tutors’ observe that when delivering the activity pack on a school environment adolescents tent to see it has another “regular” class, on the other hand when the activities are taken onto industrial or technological settings the tasks and the experiencing by the adolescents is more intense are more “real”. There is also another variant for the activities, the Summer Academy, where groups of students (approximately 15 students per group) come to the technological center during the school holidays (e.g. Easter or Summer) for enrolling in the TSP.

Table 2. Think Safety activities and approaches

Context	Activity	Approach
Classroom	Nutshell story	Hands-on
classroom	Lab IT’s	PPE’s (e.g. helmets, safety glasses, boots, safety gloves, safety cloths)
Outside	Field trips	Industrial companies; exhibitions
Classroom	Multimedia	Several multimedia animations and interactive games
Classroom	Hands-on	Experimenting with PPE’s on simulated and “real” environments; problem solvebased on project approaches
Classroom	demo	Demonstrations with safety industrial technologies

### 2.2.1 The “walnut shell” story

One of the activities provided to the student’s it’s a “black comedy” role-play. The tutors’ begin with a story of someone that works in a factory with a lot of associated risks, and it’s shown a nut with mouth and ears painted in the shell, and is referred that that person is not aware of the risks that is exposed, like heavy objects falls. And the narration continues with the nut positioned in the floor of the classroom, and the accident happens (the tutor drops a heavy object in the walnut smashing it completely). Then the tutor explains the problems concerning someone having an accident (in a job or anywhere) like the injuries associated or death, their families, the company’s impact, the costs, social and economic impacts. To finish the story, the tutor again, present to the class another person with a different behavior, that is working at the same company but resulting of some training and sensitization initiatives (like the one the students are experiencing in the TSP), he uses a safety helmet. At this point the tutor puts a coffee cup in the nut (simulating a safety helmet) and another accident happens, the object smashes the cup, but the nut came out intact. Normally, this story ends with everyone clapping their hands, and much time later, everyone remembers the implicit message.



Figure 2 – “Walnut shell” story – first character



Figure 3 – “Walnut shell” story – second character

### 3. LINKS BETWEEN “REAL LIFE” AND “FUN LIFE”

Due to the audience ages, it’s useful either for tutors, either for adolescents, to make comparisons between real life and everyday fun life activities (e.g. riding a bike, running on the park). One example, is choosing a “fun-life” activity and look at the risks by analyzing and discussing the different levels of factors that can cause accidents (e.g. context, human, technology, machine). One of the situations is the act of riding a bike, were in a simplistic way we only observe the three main components: i) cyclist; ii) bike; iii) surrounding environment/context. Then after presenting the situation is asked the audience what kind of factors can lead to accidents. Adolescents identify many tends, for example, cyclist’s attitude, no brakes on the bicycle, inappropriate tires, deficient road signalization. After this phase, they are asked to make the same exercise with a “real work situation” of an individual that works in a factory with a portable machine, and in a very correct way, these students are able to identify several factors that can lead to accidents, injuries and/or near misses, such as: workers’ lack of training on how to use the machine, wrong or inappropriate use of PPEs’, machine with no maintenance, work post without the appropriate supports for the portable machine, climate conditions such as heat (Figure 4). After both these exercises the project tutors’ encourage and entice the adolescents to apply this exercise for any real situation, and analyze the risks and safety inherent for any activity (e.g. professional, at home, at schools, in sports).



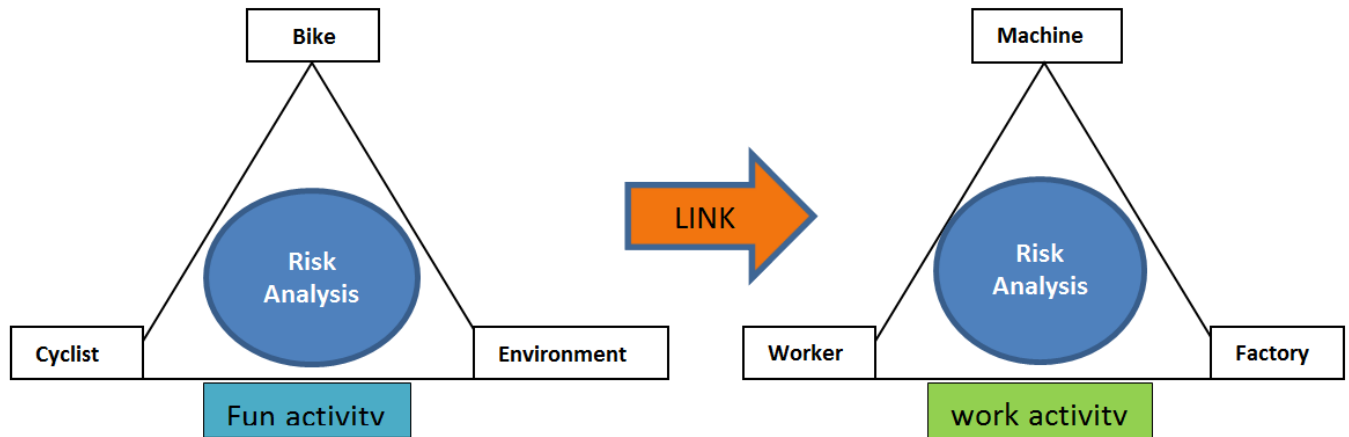


Figure 4 - Linking the risk analysis from Fun activities to Work activities

#### 4. CONCLUSIONS

Inducing safety behaviors' as a "state of spirit" in adolescents' mind has huge potential for generating future healthy and safe workplaces aligned with an improved life-quality. The future workplace must be in tandem with safety, health and quality of life for the workers. Introducing these issues in the adolescents "DNA" will have impacts on economic activities on the short and on the long term and costs will be reduced (economic, environment and social) for all the stakeholders. This goal is made possible by innovation, education and behavioral changes. Industry and other economic sectors' must be aware that workers with high safety awareness/conscience are a valuable asset. This kind of behaviors' must be intrinsic to each one and the society.

Solutions must encompass an all lot of approaches, such as formal and informal education, life-long learning, self-learning, project approaches, among many others.

Sensitization to early risk detection and prevention, and adoption of safe behaviors can be encouraged and promoted from young ages in a variety of forms e.g. TSP program. There are contexts that facilitate learning and awareness, environments that are open to new ideas where there is freedom to research and problematize. In many cases, these assets are not present on public schools and/or formal learning contexts. Promoting the capability of adolescents to be aware of their capabilities/skills/competences and power to have self-opinion, create settings that allow questioning, to think and to experiment, and promote autonomy of the future workers. Adolescents (and generally people with all ages) as entrepreneurs need to have a keen eye to understand economic, social, and scientific realities and the capacity to understand evolutionary processes in the future. By other words, they must have the capability to "see the big picture". Scientific data, common sense and intuition have told us that there is much to be done in the innovation and entrepreneurship fields to achieve economic growth. Government, business people and researchers, are aware and are taking actions. But, programs like TSP and activities associated show that everybody as the power to act. Adolescents have an immense innovative and entrepreneur potential that must be encouraged and fostered so that an entrepreneurial, innovative culture and a future sustainable fair Industry is possible. Providing sensitization to young people can help globally and individually. Globally by helping with the mentality shift for the promotion of global awareness. Individually as a mean to foster curiosity, state of spirit and the adoption of safe and sustainable behaviors'.

TSP strategy, showed that it is very important for adolescents to apply their knowledge and proficiency to tasks with an overall perceived meaning and using several different means (such as hands-on experiments, presential lessons, sharing knowledge through communities of practice, gaming) simulating as close as possible to "real" industrial settings and daily life settings. And on the other hand, the contents and the industrial awareness relevance make adolescents keen on the impact that individual behavior has on the future of a fair and sustainable society. Adolescents individually and has teams can be "trendsetters" who set their own mindset and development paths and strategies to change what is wrong.

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