AC 2008-1468: THE TOOTHPICK FACTORY: A SIMULATION GAME FOR THE SOFT SKILLS

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The Toothpick Factory©
A Simulation Game for the Soft Skills

Abstract:

FLATE, a NSF-ATE regional center for manufacturing education has as one of its goals to provide curriculum and related professional development for community college faculty and teachers that meets the needs of employers. Responses to every industry survey and questionnaire FLATE has ever conducted throughout the State overwhelming indicates soft skills, including teamwork and all aspects of communication, are high on the list of necessary, but still absent skills. One of FLATE's first objectives was to mitigate this need.

To reduce the skill gap for soft skills, FLATE developed a simulation game, "The Toothpick Factory ©" and an associated training package to teach technology teachers and faculty how to implement the game in their classrooms. Although there are a plethora of activities that offer short experiences and activities that emphasize teamwork, many are puzzle solving and survival scenarios that drop a group into a situation that requires them to work together to usually "get out" of an unrealistic place and/or situation. Other "what ifs" are even more removed from the working environment and are often used as "ice breaker" activities. These implementations may result in some learning by experience; however they do not drill down to, and emphasize the characteristics of good manufacturing workplace team work skills.

The Toothpick Factory © is a series of activities set in an actual working environment, a production facility that makes custom toothpicks. It comes with a full suite of game parts, as well as lesson plans, classroom teaching materials, and debriefing guidelines. A professional development workshop is available to help potential facilitators learn how to most effectively use the simulation. This presentation will outline The Toothpick Factory© simulation game, highlight the workplace soft skills it reinforces and summarize the initial implementation data and responses both in classrooms and facilitator training sessions.

Introduction:

Response across the nation, including the state of Florida, consistently shows the demand for qualified employees; individuals with specialized training and relevant work experience, plus vital soft skills. Soft skills refer to a cluster of personal qualities, habits, attitudes and social graces that make someone a good employee and a compatible co-worker. "Industry values soft skills because research suggests and experience shows that they can be just as important an indicator of job performance as hard skills,"[1] states Kate Lorenz, CareerBuilder.com. Soft skills such as teamwork, communication skills, and the ability to adapt to change are viewed as being equally, and sometimes more important then technical knowledge and/or education. For example, specialized training and work experience are sometimes waived for entry-level positions, as long as potential employees have the desired soft skills. Despite this concession, industry is still not able to find quality employees.

The challenge no longer lies in just finding someone with technical skills, the bigger challenge is retaining them, due to their lack of soft skills. A recent survey from Robert Half Management Resources suggests, "Job candidates who possess strong soft skills now have an edge over those who stick strictly to the education/experience." Paul McDonald, executive director of Robert Half Management Resources, stated "technical expertise is a prerequisite for candidates, but it is only one part of the equation when hiring managers assess prospective employees."[2] Industry surveys and questionnaires overwhelming indicate that soft skills, including teamwork and all aspects of communication, are high on the list of necessary, but still absent skills. Celeste Carter, director of the Biotechnology Program at Foothill College in Los Altos Hills, California states, "You need to build a base of employment skills such as attitude and communication, creative and critical thinking skills, as well as adaptability and teamwork."[3]

FLATE recognized there was a need for some type of educational workshop to provide employees with vital employability or soft skills. FLATE began researching and realized there were other soft skills workshops but none that provided a "real world" scenario where participants were given the opportunity to learn and practice soft skills in a comfortable and "safe" environment. To fill this gap, FLATE developed the hands-on simulation game, "The Toothpick Factory ©." This workplace-based scenario creates a fun exercise where participants are introduced to soft skills such as, communication, teamwork, and adaptability. They are then given the opportunity to immediately practice those skills during the hands-on activity. FLATE's goal was to create an activity that provided a comprehensive overview of soft skills and would give participants an opportunity to practice these skills, all in the same workshop.

The game:

The Toothpick Factory © is a series of activities set in an actual working environment, a production facility that makes custom toothpicks. Initially, participants are provided a comprehensive overview of soft skills (communication, teamwork, adaptability, speaking,

listening, and leadership). During this portion of the workshop, the facilitator presents the different aspects of soft skills, "what they are, why they are important, and why they are important to employers." After the introduction of soft skills presentation, participants are put into teams. The simulation requires two *types* of teams, the Production Teams and the Client Team. For most groups, there will be 4 Production Teams and 1 Client Team. The number of teams depends on the number of participants. Each Production Team consists of 4 participants and each Client Team consists of 1-4 participants, depending on the number of participants in the group. Teams are given a team "kit" with everything they need for the simulation.

The Production Teams consist of four "workers," the Pre- Production Technician, Production Technician, Finishing Technician, and a Quality Control Representative. This team represents the industry workers. Each individual has a primary responsibility within the production process and each team has a common goal, to complete as many custom toothpick orders as possible, all orders are slightly different.

The Client Team represents the customers. Their responsibility is to give and receive the custom toothpick orders. Figure 2 shows the production process, including each Production Team member's "job" and the Client Team's role. When the orders are complete, the Client Team checks the custom toothpicks to ensure they meet the order specifications. If orders are not complete or incorrect, they are returned to the Production Team for correction. The goal of the simulation is for the Production Teams to fill as many custom toothpicks orders as possible, with minimal wasted materials, in the time allowed.

Figure 1: Production Process

During the simulation the facilitator tracks each order on the Team Chart, shown in figure 2. Each order is analyzed for the number of 1) completed toothpicks, 2) rejected toothpicks, 3) wasted materials, and 4) used materials and given a total percentage completed. The Production

Team with the highest total percentage complete wins!! This creates the added pressure and competition to the simulation, increasing the importance of communication, teamwork, and adaptability within each team.

Team Chart - example

Team Name	Order #	Completed	Rejected	Wasted	Used	% Complete
Team 1	1	8	3	2	10	80.00%
Team 1	2	8	4	3	11	72.73%
Team 1	3	8	5	4	12	66.67%
Total		24	12	9	33	72.73%

$$\frac{\text{TOTAL COMPLETED}}{\text{TOTAL USED}} \quad \frac{24}{33} = 72.73\%$$

Figure 2: Team Chart used to track production

Extension (Optional Lessons):

In order to introduce more "real world" scenarios, The Toothpick Factory© created additional lesson plans for teachers. These lesson plans are designed to increase the complexity of the simulation by using Market Response Cards (MRC). MRCs are cards that are given to each team; each card requiring a different "team" action. For example, team members may be required to change jobs or teams in the middle of an order. This added stressor provides participants a look at how they and their team react to the change. Did they continue on without a hiccup or did the change cause chaos? The increased complexity and added stress gives participants an opportunity to assess their individual and team's ability to adapt to change, communicate, and work as a team.

Discussion:

The most important aspect of The Toothpick Factory© is reflecting on what occurred during the simulation. During the simulation the facilitator monitors the interactions between students, observes problem solving techniques, and keeps notes of positive and negative processes. Once the simulation is complete, the students reflect on some of the interactions, techniques, and processes that occurred in their team by completing the Soft Skills Scorecard (appendix A). The scorecard has five main soft skills categories; listening, working in teams, leading, adapting, and speaking. Each soft skills category has questions intended to help students assess their performance in a team and bring attention to these skills. Student responses are confidential, unless they chose to share them with the group.

The facilitator uses the scorecard to initiate discussion and raise awareness of the soft skills that were used (or not used) during the simulation. He or she can steer the post activity discussion to any one of the 5 categories on the Soft Skills Scorecard to emphasize a particular lesson or let the

students drive the discussion with their personal comments. The conversations should include how these skills, along with others, are important and contribute to success in the workplace. During this discussion the facilitator shares their observations about the negative and positive interactions between participants using the five main categories as a guide to help the students learn to identify specific behaviors. As a group, the discussion's broad focus is "what did we learn" about soft skills both as individuals and as teams. Students are encouraged to share their own experiences and discuss specific soft skills they observed being demonstrated during the simulation. The simulation is concluded with a review of the different soft skills, the purpose of the activity, what they learned about teamwork, and how this all affects the workplace.

Impact:

Offering two levels of training, Train the Trainer Workshops and the standard/direct workshops to students, The Toothpick Factory's© impact has been overwhelming.

The Train the Trainer Workshop offers professional development for potential facilitators to teach them how to effectively use the simulation. Along with an associated training package, The Train the Trainer Workshop is designed to teach science, technology, engineering, and mathematics (STEM) teachers and faculty how to implement the game in their classrooms. The Endeavor Academy - the Technological Research & Development Authority adopted the Train the Trainer workshop as a means to provide soft skills training and materials to educators through the state of Florida. FLATE has facilitated The Toothpick Factory© Train the Trainer Workshop throughout the United States, working with educators on effective ways to implement soft skills training into *their* classrooms.

The Toothpick Factory© Workshop (for students) has been equally successful. Providing students the overview of soft skills and the hands-on experience stimulates awareness and discussion about standards of behavior needed by employees to interact and cooperate effectively with co-workers. While each workshop offers a different perspective ranging from educators to the students, the responses are the same, as shown in figure 3.

Rate each statement below - 1 (strongly disagree) to 4 (strongly agree)	Strongly Disagree	Disagree	Agree	Strongly Agree
1. This is an effective way to promote the importance of soft-skills	0	1	15	49
2. The instructions were simple and straightforward	0	3	19	42
3. The activity was engaging	0	0	8	56
4. I would recommend this game to others	0	1	10	53
5. I see the value of using this game in my workplace	0	1	12	50

Figure 3: Results from The Toothpick Factory© surveys given to educators and students.

Conclusion:

Individuals learn how to deal with relationships at a very early age. Everyone ends up with a unique set of soft skills some are effective while others need improvement. There are many activities that offer short experiences that emphasize teamwork and include activities such as, puzzle solving and survival scenarios. Implementations like these traditionally result in some learning by experience, but do not emphasize the characteristics of good manufacturing workplace soft skills. FLATE recognized the need for a hands-on "real world" scenario based activity that would provide the soft skills training that industry so desperately needs. The Toothpick Factory's© was carefully researched and designed based on this "need." By providing activities in a manufacturing setting participant are given the opportunity to learn and practice soft skills in a comfortable and "safe" environment. The simulation has been presented to over 60 students and teachers. FLATE continues to receive responses from educators and students raving that The Toothpick Factory© is, "A very simple game to promote awareness of teamwork requirements" and ""Something that will engage the students and make it fun."

Bibliography

1. Kate Lorenz, *"What Are Soft Skills?"*CareerBuilder.com
2. Paul McDonald, *"CFO seek soft skills,"* Robert Half Management Resources, December 2007
3. Celeste Carter, *"The Softer Side of Employment Skills,"* Science Career Forum, July 2002

Appendix A

Soft Skills

FLATE –

Instructions

Use this scorecard to check how you did!! Be honest with yourself; remember there is no wrong answer!! This will help you see what soft skills are important in the workplace and contribute to your success as a team member. Circle the option (1-3) that describes your actions or none if you did not exercise a particular skill this time.

Soft Skills Categories	Actions	How often did you practice these actions today?		
		Not much	A little	A lot
Listening	1) Listen to someone's question or comment before responding.	①	②	③
	2) Listen to the needs and ideas of others with respect.	①	②	③
Working in Teams	3) Work with peers to establish goals, tasks, and processes.	①	②	③
	4) Value everyone's input.	①	②	③
	5) Encourage cooperation between peers.	①	②	③
	6) Worked with peers to resolve conflicts.	①	②	③
Leading	7) Influence others to accomplish quality.	①	②	③
	8) Encourage team members to agree.	①	②	③
Adapting	9) Express receptivity to input from peers.	①	②	③
	10) Quickly accommodate to changing conditions.	①	②	③
	11) Change production and inspection methods to improve quality.	①	②	③
Speaking	12) Ask appropriate questions.	①	②	③
	13) Communicate with a clear voice.	①	②	③
	14) Presents ideas calmly and clearly.	①	②	③
Add the points in each column				
Add all three columns.		**TOTAL SCORE**		