

Comic-Based Education & Evaluation for Cyber Security

Comic-BEE

With the rapid evolution of technology and risks, education needs to be an ongoing process. Educators need tools to help impart memorable and meaningful lessons, however explaining cause and effect of cyber events can be difficult: they don't always occur in a context that is easily or immediately visible.

How can we help people of all ages and backgrounds understand cyber security and the potential negative impacts of cyber risks - in a safe environment?



Branching interactive storytelling with Comic-BEE

Stories are powerful teaching tools: they build on prior experience through analogy and metaphor, and can be used with any age or expertise group. Branching, graphic “choose your own adventure” stories take it further by letting readers make choices on behalf of a character, causing the story to follow a variety of branches with different outcomes.

This is a novel genre for teaching cyber security because these stories give the learner an opportunity to make decisions and, more importantly, explore the consequences of those decisions in a safe environment.

Until now, creating these branching, graphic stories as curricula has been labor-intensive, requiring the combined skills of domain experts, education scientists, graphic artists, and programmers.

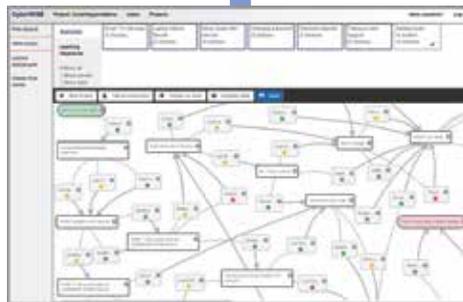
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The Comic-BEE solution

Comic-BEE is a tool for educators that integrates the curricula- and comic-creation workflows; you build your lesson and the interactive story that will teach that lesson all in one integrated process. There's no need to acquire, learn, and integrate a basket of unrelated tools. The unified user interface of Comic-BEE lets you plan, design, and create graphic branching stories in a single easy to use web-based application. And the best part is that no programmers or artists are required.



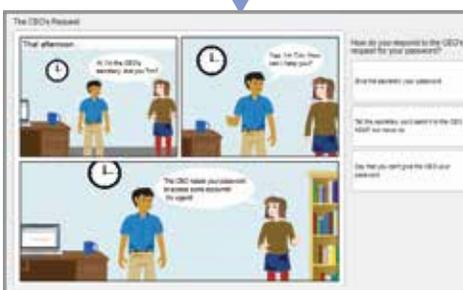
Plan the lesson Comic-BEE guides you to identify your target learners and the specific topic your comic will address, and helps you define the necessary knowledge, skills and abilities for that topic. Comic-BEE uses Bloom's Taxonomy to help structure relevant learning objectives for learners at all levels, novice to expert.



Write the script Use the lesson plan to develop the script, by writing a scene that culminates in a question with multiple choices. Each choice from a scene is associated to learning objectives from the lesson plan, and leads to a subsequent scene that illustrates the positive or negative consequences of that choice. The scenes and choices grows the branching storyline as a graph, showing the relationship of scenes and branches in the story.



Layout the storyboard Using the branching script as your guide, you visually lay out the story using Comic-BEE's panel layout templates and a library of low-fidelity graphics, creating the storyboard. Preview features allow you to check the balancing between text and graphics in a scene, as well as to check story flow and choice questions and answers.



Create the final comic Comic-BEE helps you convert the completed storyboard into full-color final comic panels. A deep library of high-quality graphic assets is provided, so you can assemble a visually compelling work with no graphic skills required. You can publish the final comic to your learners, under your complete control.

Comic-BEE

Uses

Interactive graphic stories can be powerful teaching tools for workforce, including:

- Organizational “safe computing” awareness education
- Cyber workforce education and “Continuing Ed” for technologists and cyber security specialists
- Use to assess an employee’s initial understanding of a topic before beginning specific training
- Use as a “capstone exercise”: learners create a comic to demonstrate their mastery of the topic

Looking ahead

Comic-BEE is a long-term initiative that will expand the reach and impact of critically important lessons. We have already identified ways to grow the technology to increase its value.

Scoring engine We plan to add a scoring engine to Comic-BEE, enabling the branching comics to be used for evaluation. Scored comics could be used to evaluate knowledge, skills and abilities (KSAs) of current and future employees to demonstrate KSAs not addressed by degrees, or to identify gaps. Competitions have been well established as powerful vehicles for cyber security education, and the scored comics could also be used as a new cyber competition platform as an alternative to Capture the Flag type (CTF) and addressing a wider range of KSAs.

Alignment with NICE Workforce Framework We plan to enhance the Plan Lesson workflow with the cyber workforce roles identified in the National Initiative for Cybersecurity Education (NICE) workforce framework, and the corresponding knowledge, skills and abilities. This will enable the creation of curriculum that is aligned with specific workforce roles.

Increased automation In the next phase of development, we will leverage increased automation to further streamline the process of creating the comics, from enhancements to convert storyboards to final comics, to populating draft storyboards from script elements such as characters and locations.

System Specifications

Comic-BEE is a web-hosted application that requires, at minimum, Microsoft IIS 7.5 and SQL Server 2012, on Windows 7. It can be hosted internally, or in the cloud.

Users access Comic-BEE through a web browser. Firefox, Chrome, and Internet Explorer 11 are explicitly supported, but Comic-BEE will likely run properly on any contemporary browser that supports HTML5.

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Key Benefits

Innovative Education

- A new cyber security educational technology that is engaging to learners across many age groups
- Provides visual interface to story structure, greatly simplifying the task of modifying a branching story

Rapid Development

- Create cyber curricula using complex, branching graphic stories in days, rather than the weeks required by current manual process

Easy to Deploy and Use

- No distribution or per-user fees: once you create a story you can use it as much as you like
- Supports deployment-specific branding for seamless integration into your environment

What's special about Comic-BEE?

There are partial solutions in the market (Pixton, Bitstrips for Schools, ToonDoo, Storyboard That, ComicLife, Toontastic, and more) for creating graphic stories as educational curriculum, but each has limitations. Comic-BEE is designed to overcome these obstacles, making it easy for educators with all sorts of skillsets and a wide range of budgets to create and deploy interactive graphic stories:

- Comic-BEE does not require programming and/or artistic skills
- Integrated user interface and workflow in Comic-BEE supports curriculum development (learning objectives, scenarios, metadata, etc.)
- Multiple, branching graphic story lines are easy to create in Comic-BEE
- Software license and maintenance fees are not on a per user or per comic basis; government use
- Comics created with Comic-BEE can be hosted on any web server, and you can brand the content as your own



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