

# Educational Nonlinear Stories with Twine

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## ABSTRACT

Multiple studies have hinted at the positive effects of educational games on learner engagement. However, some games, if they exist, may not be readily usable for some lessons even though the same topics are covered. In this workshop, the participants will be introduced to Twine, an open-source development environment for nonlinear stories that requires little to no coding. Tips and tricks to making engaging stories that target desired learning outcomes derived from existing research will be shared. The participants will have the opportunity to apply these insights through a group activity where they create their stories for a lesson. They will then individually create games for their stories and share their works to the rest of the group. An online community will be created after the workshop for the participants to continue exchanging ideas or creations afterwards.

## CCS CONCEPTS

• **Applied computing** → **Interactive learning environments.**

## KEYWORDS

interactive storytelling, interactive narrative, branching narrative, nonlinear stories, Twine, educational games, gamification, serious games, interactive learning environment

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## 1 BACKGROUND

Gamification, broadly speaking, is the "use of game design elements within non-game contexts" [5]. Several studies from different research areas point to the positive effects of gamification in the educational setting: education science stress that play is important to learning; game studies, along with works in other fields, indicate that games increase motivation; neuroscience points that games contribute to increased brain volume and plasticity; finally, information science show that gamification lead to increased personalization [4]. Gamification is also a point of interest for learning at scale [16]. However, results from earlier gamification research, while positive leaning, tend to have mixed results [15]. This maybe due to multiple different game design elements – badges, leaderboards, avatars, and stories, among others – at play.

One important game element that was shown to have positive effect is meaningful story. Meaningful stories are gaming elements that allow the players to experience the effects of their actions, making such actions meaningful, whether they were executed by choice or not [13]. Meaningful stories provide shared goals for the players even when they are not playing together, thus satisfying an individual's basic psychological need for social relatedness [14]. Stories that require decisions also satisfy the need for autonomy and increases enjoyment, motivation, and the likelihood to play again [11].

In traditional stories, the writer controls the direction of the story. On the other hand, nonlinear stories - also known as interactive storytelling, interactive narratives, branching narratives, or choose your own adventure, among others - give the audience the agency of influencing how the story progresses. A nonlinear story features decision points where the story branches as a consequence of the choices the audience made.

Nonlinear stories have been used in teaching highly complex topics such as social exchange theory [12], cybersecurity [2], and ethics [10]. This approach provides some degree of personalization as each learner engages with the content differently. As a hunch, the organizers believe that nonlinear stories may also be used for instruction in a flipped manner: instead of playing a nonlinear story game, the learner creates their own nonlinear story to gain transversal skills such as critical thinking, creativity, and computational thinking.

Unfortunately, using educational games, whether nonlinear stories or not, can be challenging [9]. The most obvious challenge is

the cost of game development. For nonlinear stories, game development can be difficult even with the right tools since the instructor need to extract relevant concepts in class and find creative ways to narrate them [1]. Another concern is ensuring the game and the time the learners can allocate to play the game are sufficient to meet the desired learning outcomes. Part of the time needed is learning how to play the game as well, which is hopefully a significant concern for a relatively common game form such as nonlinear stories.

In this workshop, we will discuss ideas on how to use games, specifically nonlinear stories, in instruction based on existing research. We will introduce the participants to Twine, an open-source platform for creating nonlinear stories that does not require coding [7]. We will also share some tips and tricks on how to make nonlinear stories more interesting in a less taxing manner.

Scale may not be needed to see the positive effects of using games developed with Twine in learning environments; as a matter of fact, the original studies cited in this work did not employ thousands of participants. Nevertheless, this workshop may still be of interest to the learning at scale community, for several reasons.

- Twine outputs HTML files which can easily be embedded in learning management systems (LMS) used for several at-scale programs.
- The participants can hopefully replicate the workshop and share the knowledge to their colleagues.
- There are several huge online communities the participants may ask help from should they choose to apply what they have learned from this workshop in their classrooms. Some of these include r/twinegames on Reddit (<https://www.reddit.com/r/twinegames/>); the official forum for Twine, the Interactive Fiction Community Forum (<https://intfiction.org/>); and other interest groups in storytelling, among others. Online communities are breeding grounds for informal interest-driven learning at scale [3].

At the end of this workshop, the participants should be able to:

- Evaluate whether a lesson is a suitable candidate for gamification,
- Create a simple game with Twine, and
- Conceptualize an engaging story for their lessons that will not appear to be a regular quiz in disguise.

Teachers who have been increasingly creating online materials (i.e., have some familiarity with web technologies such as HTML) but are just beginning to explore available tools for increasing online learning engagement would benefit the most from this workshop (individuals with more advanced web development skills might find the pace too slow). The following might also benefit from attending this workshop:

- Teachers who are looking for innovative ways to engage their learners,
- Instructional designers who may be able to add highly customized content into their courses,
- Administrators, consultants, or other professionals providing guidance to aforementioned individuals,
- Researchers who are interested to study gamification but do not have the necessary infrastructure for research yet, and

- Individuals who are generally interested in gamification and storytelling.

## 2 ORGANIZERS

**May** is a postdoctoral researcher at Tokyo Institute of Technology (TokyoTech) and a software engineer at a small-scale company in Tokyo with subsidiary in the Philippines. Her research revolves around improving online learning experiences, may it be through technology-assisted instruction or learning analytics for course quality assurance. Inspired by Japan's Society 5.0 – a future society where the cyberspace meets the physical space [8] – her upcoming research works target personalized learning in extended realities.

**Donn** is an Instructional Designer at the Centre for the Enhancement of Teaching and Learning and a Lecturer at the Faculty of Education at the University of Hong Kong. His research interest is integrating technology in teaching and learning and teachers' perception of the use of technology. He teaches e-learning strategies and digital storytelling courses and runs several professional development workshops and seminars to improve students' overall learning experience.

**Eden** is a specially appointed associate professor at TokyoTech's School of Environment and Society. She works closely on the Global Scientists and Engineers Program (GSEP), TokyoTech's first, and currently only, fully English undergraduate program. Her current research interest is science communication, public engagement in science and has previously done research in photocatalysis and waste utilization.

**John** is a lecturer at the Institute for International Relations teaching students from the School of Engineering at University of Hyogo. He has been working on AI Kaku (<https://www.aikaku.app/>), an AI-based writing assistant for English language learners. His other research interests include defining ethical frameworks for the use of AI in education.

**Tony** is an associate professor at National Institute of Technology, Hakodate College. His overarching research theme is on foreign language education. His main research project at the moment is on "Virtual Ryugaku," or enabling learners to gain cross-cultural experiences through virtual worlds.

**Jeffrey** is a professor at TokyoTech's School of Environment and Society and the general manager of TokyoTech's Online Education Development Office (OEDO) – the group developing MOOCs for TokyoTechX on edX. OEDO also supports TokyoTech faculty through development of SPOCs, assistance with instructional materials creation such as video lectures, and consultations on copyright issues. His laboratory conducts research on various topics of global concern such as waste conversion, environmental toxicology, renewable energies, learner competencies, and educational technology.

## 3 PRE-WORKSHOP PLANS

The workshop will be half-day mode (3 hours in total), and remote option, morning timeslot (assuming Eastern standard time) is preferred. If remote is not possible, then the afternoon timeslot is preferred as the organizers might need to acclimatize with time zone differences. The maximum number of participants will be 40 to allow organizers give ample support during group activities.

A pre-registration process will be done to ensure the maximum participant number is not exceeded and to gauge the participants' prior experience. The Call for Participants section, which is included in this proposal, will be provided along with a list of requirements during pre-registration. All the participants are required to:

- Have their own laptop with sufficient power to last for three hours,
- Install the application needed before hand for remote participation (Zoom is preferred if there is no prescribed platform for the conference), and
- Check that they can access <https://twinery.org/> beforehand (participants can choose to download and install the application as a contingency).

Should the workshop be done face-to-face, here are the requests with regards to the conference venue:

- Should be able to fit 50 people after all other restrictions are considered (e.g., social distancing measures if still in effect),
- Projector(s) that can connect with the presenter's laptop,
- Stable Wi-Fi connection that can support 50 people working online at the same time, and
- Movable tables for the group activity.

Presentation materials and activity sheets will be prepared in advance. The activity sheets will be printed and distributed during the face-to-face event, or shared via a collaborative online whiteboard such as Miro for remote event. Sample output products will also be prepared in advanced and shown to the participants during the workshop.

## 4 WORKSHOP STRUCTURE

**Presentation: Introduction (15 minutes).** The workshop will kickstart with a self-introduction from the organizers. Nonlinear story games will then be introduced along with some examples of how these are used for educational purposes. An overview on current research and perceived challenges with educational games will also be presented. This will include introducing quick guides for evaluating whether a lesson or a course is a suitable candidate for gamification. The Office of Research Integrity's interactive video "The Lab" [10] will be introduced as an example of nonlinear story used in a learning setting.

**Individual Guided Activity: Twine Hands-on Tutorial (45 minutes).** The participants will create a nonlinear story game alongside the organizer's demonstration using Twine. The focus will be on creating a nonlinear story game, which will later be embellished with simple HTML, CSS, and Javascript code. The participants will be introduced to key concepts in nonlinear stories such as passages, variables, decisions, events, player models, world state, and storylets, among others.

**Presentation: Creating Nonlinear Stories (30 minutes).** The organizers will share some ideas on creating nonlinear stories for instructional purposes. The Mechanics, Dynamics, and Aesthetics (MDA) framework [6] as seen in the interactive video "The Lab" will serve as the jumping point for discussion. This will include structuring games to achieve learning outcomes and increase learner engagement.

**Group Guided Activity: Story Creation (30 minutes).** The participants will be divided into groups of three to five people.

They will select from a predefined list of instructional topics and story archs to help jumpstart the story creation. Organizers will visit groups from time to time to provide guidance. They will be guiding the participants through the step-by-step process of story creation. Alternatively, the participants can also proactively ask for the organizers' support.

**Individual Independent Activity: Game Creation (30 minutes).** Since the Twine platform does not allow live collaboration, the participants will be creating their games using the story created by their groups individually. They are not allowed to start new stories to allow sharing with the group later on during the workshop. They may, however, choose to go beyond the created story if time permits.

**Group Independent Activity: Sharing (15 minutes).** The participants will be given a few minutes to showcase their individual work to their groups. They can also share the difficulties they encountered and other ideas they came up during game creation. They will also choose a representative who will share insights on their behalf to the rest of the participants.

**Discussion: Wrap-up (15 minutes).** The individual groups will present the results and takeaways from their discussions. If time permits, the organizers will show some other ways to embellish the games (e.g., by using three-dimensional assets). The workshop will close with discussion regarding next steps.

## 5 POST-WORKSHOP PLANS

A thank-you email will be sent to all the participants along with an online survey and an invitation to join a Discord server. The online survey is to solicit feedback that may be used for future similar events. The Discord server is to create a space where members can exchange ideas long after the workshop has concluded. The presentation slides and activity materials will be shared with participants a well.

## 6 CALL FOR PARTICIPATION

Nonlinear stories such as those from the Choose Your Own Adventure book series can be an interesting way of keeping learners engaged. Join us in this half-day (three-hour) workshop to learn how to use Twine, an open-source platform for creating nonlinear story games in HTML format that requires little to no coding. Since it is in HTML format, you can use it with most learning management systems such as Moodle or Canvas or host it in your own websites. We will also share some tips and tricks to make your stories interesting. More importantly, we will brainstorm how to effectively use nonlinear stories for instruction so that they will not end up as quizzes in masquerade.

The workshop will be organized as follows:

- (1) Presentation: Introduction (15 minutes)
- (2) Individual Guided Activity: Twine Hands-on Tutorial (45 minutes)
- (3) Presentation: Creating Nonlinear Stories (30 minutes)
- (4) Group Guided Activity: Story Creation (30 minutes)
- (5) Individual Independent Activity: Game Creation (30 minutes)
- (6) Group Independent Activity: Sharing (15 minutes)
- (7) Discussion: Wrap-up (15 minutes)

You will need a laptop with sufficient power to last three hours and a stable internet connection. Sign-up by May 23, 2022 (maximum of 40 participants).

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