SHAPING THE NETWORK COMPETENCIES OF YOUNG GIRLS FROM MINOR TOWNS AND RESTRUCTURED AREAS AS FUTURE BUSINESS LEADERS OPERATING IN A 4.0 ECONOMY

TEACHERS' TOOLKIT

PART 2

METHODS AND TOOLS FOR ONLINE LEARNING AND COLLABORATION. WORK ASSESSMENT

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Creators:

Jacek Bendkowski Anna Kowalska Małgorzata Świerkosz-Hołysz	WSB University, Poland
Gražina Čiuladienė Agota Giedrė Raišienė	Mykolas Romeris University, Lithuania
Matěj Mareš Martina Pokorná	Responsible Society NGO, Czech Republic
Paula Mihai	Transylvanian Furniture Cluster, Romania

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1. METHODS FOR COLLABORATIVE LEARNING TO DEVELOP DIGITAL COMPETENCIES IN TEENAGE GIRLS

When working with girls from economically and socially disadvantaged communities, it is essential for trainers and educators to meet learners where they are. Many of these girls begin their digital journey with very low baseline abilities, often having limited exposure to formal ICT education, structured digital environments, or positive learning experiences. This does not indicate a lack of potential - it reflects systemic barriers, including poverty, gender bias, under-resourced schools, and social expectations that prioritize domestic responsibilities over education.

As a result, training methods and tasks must be carefully adapted to reflect the learners' real-life contexts, linguistic background, learning pace, and prior experience with technology. Overloading them with theory or advanced tools too early can be discouraging. Instead, training should begin with simple, relatable tasks that are immediately meaningful - such as using a phone to record a story, editing a photo, or researching a question on a search engine.

Key training strategies can include:

- Scaffolded learning (providing temporary support for an inexperienced learner to help them complete a task or acquire a skill, and then gradually withdrawing that support): Building gradually from digital knowledge to basic skills and eventually to applied competence.
- Peer support & collaboration: Creating safe, inclusive learning environments where girls can teach and learn from each other.
- Relevance to their lives: Framing tasks around real-world interests—such as hobbies, local businesses, family life, or social issues they care about.
- Frequent affirmation: Encouraging participation, celebrating small wins, and reinforcing that learning digital skills is not a luxury, but a right and a future investment.

While it is important to start simply, training should not remain static. The goal is to encourage progression - from knowledge to skill, and from skill to competence. This means guiding learners beyond “how to use a tool” toward understanding why, when, and in what ways

digital tools can help them communicate, advocate, solve problems, express themselves, and even earn a living.

True digital competence is about confidence, critical thinking, and autonomy. For a teenage girl in a low-income context, this may begin with uploading a TikTok video but can evolve into creating her own YouTube tutorial channel, launching a small business page on Instagram, or teaching her peers about online safety.

Training must be flexible and empowering - not just instructional. It should foster a growth mindset, emphasizing that digital competence is developed over time, and that each learner's journey is valid. With the right structure, support, and motivation, even those who begin with very limited skills can blossom into confident, capable, and responsible digital citizens.

1.1 Project-Based Learning (PBL)



Project-based learning (PBL) is a l earning approach that uses student-centered research procedures to create a product with connections to and applications in the real world. Essentially, PBL involves a complex task based on challenging questions or problems, where students are involved in designing, problem-solving, making decision and researching. PBL supports constructivism learning theory by assisting students in developing strong comprehension through exploration (Saad & Zainudin, 2024). Instead of having students memorize new information, this approach encourages them to develop and analyze it. Knowledge is created by students themselves via active participation in the teaching and learning process. The PBL approach helps lower students' cognitive burden and improve their learning achievements. When putting together a project, students work as a team to exchange knowledge, inspire one another, respond to one another's feedback, aid in understanding, and learn from one another. Group work also has a positive impact on students' self-esteem

Project-based learning (PBL) has gained popularity recently as an educational strategy that promotes students' interest and cognitive development (Pan et al., 2022). Chiu (2020) contends that PBL can enhance higher-order thinking abilities rather than factual knowledge. Moreover, as acknowledged by Deep et al. (2019), even 13 soft skills can be developed and

nurtured through the PBL approach, which are social, teamwork, problem-solving, soul management, ethics and morals, communication, continuous learning, leadership, crisis management, creative thinking and critical thinking, managing information and entrepreneurship. Students use two key twenty-first-century skills when participating in PBL, namely learning and innovation skills (critical thinking, problem solving, collaboration, creativity, and innovation), as well as digital literacy skills (information literacy, media literacy, information, and communication) (Voinohovska et al., 2019).

However, based on the research results by Aldabbus (2018), more than 75% of teachers were unable to apply PBL due to several obstacles, including selecting essential content, managing their time, monitoring and evaluating their progress, and lacking resources. Similarly, Hinton (2022) emphasized difficulties with PBL implementation, including the relative breadth, depth, and assessment of learning. Thus, effective PBL-CT implementation would be facilitated by appropriate learning methodologies, together with appropriate techniques, tools, and frameworks.

TO CONCLUDE, PBL supports constructivism learning theory by assisting students in developing strong comprehension through exploration. Students learn actively, engaging in real-world and personally meaningful projects. Even 13 soft skills can be developed and nurtured through the PBL approach (Saad & Zainuddin, 2022).

1.2 Online Collaboration Platforms



Online Collaboration Platforms provide a virtual environment for knowledge transfer and integration. They enhance wider participation, enable network effects to take place while also reduce transaction costs. Digital platforms support new forms of involvement through interactive and empowering ways of participation and co-creation; they also evolve in real life contexts. At the same time, the selected applications support user engagement in a different stage of the process.

There are many examples of web-based platforms supporting the different stages of innovation process, from idea generation, to financing and marketing. The level and type of user

participation in these platforms varies extensively and can range from a simple voting to content generation (new idea/solution, data, software) or financial contribution.

- *Idea generation and screening*. The most popular web-based platforms for collaborative innovation refer to crowdsourcing ideas – platforms that focus on brainstorming and providing solutions: IdeaConnection, Threadless, Innocentive, and Kluster or social innovation, in the sense of designing solutions for the world's biggest challenges like Global Ideas Bank and OpenIDEO.
- *Experimentation and implementation*. This may refer to a commons-based peer production such as Wikipedia, which is a bottom-up model of socio-economic production where a wide number of individuals is coordinated into large projects without traditional hierarchical organization. It may also refer to fab lab platforms, such as Fab Lab Connect or Fab Lab Platform, which break down the boundaries between the digital and physical world by providing tools to manage Fab Labs (e.g. book workshops, reserve machines and space etc.). Finally, it might refer to platforms that allow sharing of individuals' resources through the use of new business models that disrupt traditional industries (e.g. Uber, Airbnb).
- *Financing*. Crowdfunding practices, aiming to raise monetary contributions from a large number of people, are more effectively (more securely and with higher scalability) performed through digital platforms (including Kickstarter, Indiegogo, Citizinvestor, Neighbor.ly or Spacehive).

TO CONCLUDE, digital platforms allow wide participation in the innovation process, strengthening and seizing network effects, and enhancing the ability of people to collaborate and create bottom-up innovative solutions to complex problems.

1.3 Digital Storytelling and Content Creation



Digital storytelling is the art of combining narrative with digital media such as images, sound, and video to create a short story. Digital storytelling can be an engaging way to instruct and assess students. The

digital story, which dials into digital natives and connects them with the curriculum, represents one of our most powerful instructional tools.

In the Digital Storytelling cookbook, Lambert (2002) provided main aspects of the method, which are such as:

- point of view (outlines the point of the story and the perspective from which the story is told);
- a dramatic question (sets the tension of the story by identifying issues to be resolved);
- emotional content (engages the audience through common emotions and themes, e.g., love, pain, humor);
- the gift of your voice (helps the audience make meaning of images);
- the power of the soundtrack (sets the mood of the story);
- economy (balances the auditory and visual tracks of meaning);
- pacing (sustains the attention of the audience by establishing and modifying the rhythm of the story).

The process of creating a digital story involves leveraging a wide variety of skills, including researching topics, writing scripts, storyboarding, and assembling the final product using video editing software. When creating their own digital stories, students encounter an integrated instructional activity that requires them to leverage a host of cognitive, interpersonal, organizational and technical skills (Robin, 2008).

TO CONCLUDE, digital storytelling connects students to content in ways that they are accustomed to consuming information. Storyteller often uses a framework of humor and music to craft stories that are clever, quick, and funny. The process for achieving this varies, depending on the creativity of the storyteller and the whim of the viewers en masse.

1.4 Virtual Exchange Programs

Virtual exchange projects (VEP) are considered an effective method to enhance learners' ICT and digital competence. VEP are described as methods of bringing learners together from all

over the globe to develop skills and attitudes through collaborative tasks. It offers the opportunity for learners from all over the globe to co-create learning environments and encourage self-development through interaction and cooperation (Fritz and Marchewka, 2024).

Through a variety of internet-based tools, VEP classrooms offer original and cost-effective experiences to increase learners' both digital competencies and global competence, intercultural awareness, and academic self-efficacy (Sernbo et al., 2024).



Online classes/ meetings can be conducted with the Zoom application, while the Padlet application might serve as the project management platform to implement the VEP. The structure might vary accordingly the aim, duration, characteristic of participants, etc. For example, a program might comprise of uploading a self-introduction [to Padlet], aiming to raise the awareness of each member's individual personality. The introduction meeting might be organized as a synchronous Zoom class in order to introduce the VEP structure, project tasks, the expected learning outcomes, and how to use Padlet. Breakout rooms are to be used for participants' discussions. The participants can contact their partner arranging synchronous meetings using most suitable for them synchronous communication tools (e.g. Zoom, Skype, Facetime, etc.) and / or asynchronous tools (e.g. SMS, WhatsApp, Facebook Messenger, etc.).

Engaging in virtual exchange helps students develop skills to understand and handle the virtual tools necessary for future workplaces. Virtual mobility can be regarded as an opportunity to improve the mutuality of knowledge exchange between students and a way of increasing the accessibility of international exchange for students who otherwise would not have had the opportunity to participate, e.g. students with carer obligations or students from less well-off backgrounds (Sernbo et al., 2024).

However, students who partake in a virtual exchange step outside their comfort zone, e.g. when exploring new ways of communication and engagement. In the international context, insecurities about language and norms might affect students, teachers and interactivity. Language insecurities might result in feelings of being inhibited in their participation (because of English not being their mother tongue). Actively working to create the feeling of a safe space for online reflections is therefore essential in international virtual exchanges—focusing on interactions as

well as structure. Participation, interaction and the feeling of a safe space cannot be taken for granted. It requires a clear structure and the feeling of knowing what is expected of you as a student, as well as the establishment and maintenance of supportive relationships between students and between teachers and students (Sernbo et al., 2024). In addition, a small size of the internationally mixed student groups can be understood as having provided a safe space for enhancing mutual knowledge exchange and training in global citizenship. Within these groups, students informed each other about digital education in their respective countries whilst also helping each other to identify value differences and similarities.

TO CONCLUDE, engaging in virtual exchange helps students develop skills to understand and handle the virtual tools necessary for future workplaces. Virtual mobility can be regarded as an opportunity to improve the mutuality of knowledge exchange between students and a way of increasing the accessibility of international exchange.

2. ONLINE TOOLS FOR COLLABORATIVE LEARNING

This section presents selected online tools for collaborative learning recommended in project-based education.

- **Mentimeter** - is an interactive platform that allows you to create presentations with questions, quizzes, surveys, and word clouds that students complete in real time using their phones or computers. Development of online skills: students learn to communicate in a digital environment, express their opinions in an organized manner, and collaborate in an online space. Mentimeter promotes activity and transparency in communication.

  Recommended for:

  - Entrepreneurial skills – at the beginning of the lesson, students anonymously answer the question: "What does it mean to be entrepreneurial?" The results form a word cloud, which becomes the starting point for further discussion.
  - Time management – the teacher conducts a quiz with questions such as: "Which planning technique is best for quick tasks?" The results are discussed together.

- **Padlet** - as an online collaboration space: it is a virtual board where students can jointly add notes, photos, links, or recordings. Each element is visible to everyone, which supports teamwork. Development of online skills: students practice remote collaboration, organizing information, and jointly building knowledge. Padlet also teaches responsibility for content published online.

  Recommended for:

  - Teamwork development – groups create a shared board with rules for good cooperation, based on their own experiences.

- Digital skills in project implementation – students create a map of digital tools for a specific project.

- **Canva** – creative presentation of educational content: it is an intuitive graphic design platform that allows you to create presentations, infographics, posters, social media posts, and many other visual materials. Thanks to ready-made templates and a simple interface, even novice users can prepare aesthetic and legible content. Canva teaches visual communication planning, selection of appropriate forms of communication, and online collaboration (in team projects). The tool also develops media and digital skills, strengthening the ability to create materials promoting project activities.

  Recommended for:

  - Business plan – students create a presentation in Canva describing their business idea, including graphics, promotional slogans, and visual data.
  - Project evaluation and promotion – project teams design posters or social media posts summarizing the course and results of the project.
  - Digital competences in the project – students jointly create an infographic "Map of digital tools" illustrating the tools used in the project.

- **Miro** – an online board for conceptual and team work: It is an interactive, comprehensive online board that allows collaborative work on diagrams, mind maps, timelines, and project boards. The tool allows multiple people to simultaneously add content, organize tasks, and comment on them in real time. Miro supports the development of planning, distributed collaboration, and project documentation skills. Students learn to work in a shared workspace and effectively communicate their ideas in a digital environment.

  Recommended for:

- Project development stages – students work together to build a timeline or diagram illustrating the successive stages of project activities.
- Risk management – teams develop a SWOT analysis or risk map on a shared Miro board.
- Project implementation – students regularly update the board with progress reports and assigned tasks.

- **Trello** – task management and team collaboration: It is an online project management application based on the Kanban board principle. Users create cards with tasks that can be moved between columns corresponding to work stages (e.g., "To do," "In progress," "Done"). Students learn how to plan and organize teamwork in an online environment. Trello allows them to monitor project progress on an ongoing basis, share responsibilities, and communicate in a task-oriented manner.

  Recommended for:

  - Assigning tasks in a project – students assign specific activities to individual team members and track their progress.
  - Project implementation – the Trello board serves as a schedule and progress log, with the ability to add comments, deadlines, and attachments.
  - Digital skills – students learn how to use a tool for remote work and distributed task management.

- **Genially** – interactive presentation of knowledge and ideas: It is a platform for creating interactive presentations, infographics, quizzes, and educational escape rooms. It allows you to insert animations, links, videos, and gamification elements, which makes the materials more visually appealing and functional. Students learn to convey content in an engaging way by

creating interactive materials tailored to their audience. The tool develops the ability to plan digital communication and collaborate on creating joint online presentations.

Recommended for:

- Business plan – students design an interactive presentation describing their business idea, in which the user explores the content themselves.
- Stages of project creation – groups create a visual map of activities with embedded media, links, and animations.
- Project evaluation – students prepare an educational escape room summarizing the knowledge gained while working on the project.

- **Whiteboard (Microsoft)** – a digital whiteboard for collaborative creation: It is a simple online board for collaborative content creation. Participants can add notes, drawings, images, and text in real time. Thanks to its intuitive nature, it works well for both individual and group work. Whiteboard (Microsoft) supports synchronous collaboration, idea organization, and creative visual activities. It teaches students how to share digital space with others and respond to content published by the team.

  Recommended for:

  - The importance of teamwork – students work together to write down the characteristics of a good team or analyze a case study.
  - Risk management – groups create a map of problems and possible responses in the form of notes.
  - Entrepreneurial skills – students create a graphic “development tree” containing their strengths and goals.

- **Google Forms, Microsoft Forms and Typeform** – surveys and data collection: These three platforms are used to create online forms, surveys, and quizzes. They allow you to collect responses, analyze them, and export the results. Typeform stands out in particular for its aesthetic, "conversational" interface. Students learn how to collect information from others, process data, and analyze results. They also learn how to formulate clear questions, plan research, and work with online results.

  Recommended for:

  - Entrepreneurial skills – students conduct a survey on the characteristics of an entrepreneurial person and analyze the results.
  - Interpersonal communication – preparing a quiz to test communication preferences within a group.
  - Project evaluation and promotion – creating an evaluation form for recipients or participants of activities.

- **Kahoot** – learning through competition and fun: It is a platform for creating quizzes and tests in the form of games. Students answer questions using mobile devices, earning points for correctness and speed. The tool allows you to create your own quizzes or use ready-made educational resources. Kahoot engages students in collaborative online activities, teaching them reflexes, competitiveness, and how to respond to digital content in real time. It also develops their ability to work with information and make quick decisions in an online environment.

  Recommended for:

  - Project goals - SMART technique – a quiz to test understanding of goal setting principles

- Interpersonal communication – funny questions about communication styles or typical team situations.
- Digital skills - enhancement of existing knowledge.

- **Slido** – quick interaction with participants: It is a platform for organizing question and answer sessions, polls, and quizzes. It is particularly useful during presentations and online meetings, allowing participants to ask questions, comment, and vote on the most interesting topics. Slido develops the ability to communicate in a remote environment, actively participate in online events, and conduct digital discussions in a civilized manner. It also teaches how to formulate questions clearly.

  Recommended for:

  - Business plan – students ask questions about other teams' presentations.
  - Project evaluation – students vote on which elements of the project they found most interesting or valuable.
  - Risk management – brainstorming with voting on the biggest risks in the project.

- **Google Meet, Zoom and Microsoft Teams** – online communication and collaboration platforms: these are the three most popular platforms for video conferencing, online teaching, and remote collaboration. They enable video calls, screen sharing, breakout rooms, chat, and collaborative note-taking. Students learn effective online communication, remote conversation culture, meeting time management, and netiquette rules. These platforms support the development of digital responsibility and team coordination.

  Recommended for:

  - Teamwork – holding project team meetings with division of

roles and setting schedules.

- Project evaluation and promotion – conducting video presentations in front of the class or invited guests.
- Project implementation – ongoing consultations with the teacher and monitoring progress.

- **Prezi** – dynamic presentations and visual storytelling: It is a tool for creating non-linear, animated presentations that, instead of traditional slides, move in space, allowing you to build visual stories using movement and zooms. Ideal for presenting processes, relationships, and projects in the form of a map. Prezi develops the ability to present and visualize data in a modern, engaging form. It also supports cloud collaboration and conscious digital narrative planning – from idea to message.

  Recommended for:

  - Stages of project implementation – students create a visual map illustrating the successive steps of project implementation.
  - Entrepreneurial skills – presentation of the student's "skills development" in the form of a path or decision tree.
  - Business plan – teams build an animated presentation of a product or service with an emphasis on customer needs.

- **Google Workspace and Microsoft 365** – digital work environment: these are integrated sets of online tools for creating documents, spreadsheets, presentations, calendars, collaboration, and cloud file storage. Google Workspace (e.g., Docs, Sheets, Slides, Drive) and Microsoft 365 (Word, Excel, PowerPoint, OneDrive) are the foundation of remote and team work. Students learn to co-

create documents in real time, share materials, and manage files online. These environments teach responsibility for shared resources and the organization of digital information.



Recommended for:

- Project implementation – teams create shared documents with descriptions of activities, schedules, and work results.
- Project evaluation – students fill out a shared form or sheet with an assessment of the stages of work.
- Time management – use of Google Calendar or Outlook to plan project tasks.

- **Google Slides and Google Sheets** – data presentation and analysis: Google Slides is a tool for creating online presentations, while Google Sheets is a cloud-based spreadsheet application. Both allow multiple people to work simultaneously and comment on content in real time. Students learn how to collaborate on documents, analyze data, co-edit, and present results. Spreadsheets develop the ability to work with numbers and organize information, while presentations develop visual communication skills.

Google Slides

Google Sheets

Recommended for:

- Project evaluation and promotion – students create a Google Slides presentation summarizing the course and results of the project.
- Assigning tasks – Google Sheets as a table with tasks and responsible persons.

- **Adobe Express** – creative multimedia content production: It is an intuitive online tool for creating graphics, videos, and

Adobe Express

animations. It offers ready-made templates for posts, flyers, videos, and presentations—all editable even for beginners. Adobe Express develops the ability to create visual content, work on projects, and present the results of activities in an aesthetic way. Students learn to plan visual messages, adapting the form to the channel and audience.

Recommended for:

- Project promotion – students design posters or short promotional videos summarizing project activities.
- Business plan – preparation of marketing materials for a virtual product/service.
- Project evaluation – students create visual summaries or video reports on the implementation of activities.

- **YouTube** – video presentation and project documentation: enables the publication, editing, and sharing of videos. It can be used as a platform for presenting the results of project work or creating instructional, advertising, and reflective materials. Students learn how to plan audiovisual communication, edit videos, and communicate using mass media channels. This tool develops media awareness, responsibility for content, and visual communication skills.

  Recommended for:

  - Communication and promotion – publishing reports on project activities.
  - Project evaluation – students record their reflections on what they have learned.
  - Entrepreneurial skills – creating a video advertising a product or service.

- **Blogs** – project narrative and student reflection: an educational blog is an online space where students can keep a project journal, publish reflections, photos, links, and reports on the progress of their work. Platforms such as Blogger, WordPress, and Medium are easy to use and accessible from any device. Blogging teaches consistency,

content planning, narrative creation, and written communication in a public environment. It also develops the ability to edit content in accordance with netiquette rules.

Examples of application in the topics covered:

- Project implementation – students report on the team's activities by publishing photos and comments.
- Digital skills – reflection on the tools used in the project.
- Evaluation – summarizing experiences in the form of posts.

- **Social media (TikTok, Instagram, Facebook)** – promotion and communication with the community: these platforms are the everyday communication environment for young people. They enable the publication of short videos (TikTok), photos and stories (Instagram) and the management of project profiles, events and campaigns (Facebook). Their promotional and reach potential is enormous. Young people learn to plan messages for specific target groups, choose the right format for the platform, take care of aesthetics, and take responsibility for the content they publish. They develop marketing skills and awareness of their digital presence.



Examples of application in the topics covered:

- Project evaluation and promotion – publication of reels, stories, or campaigns promoting activities.
- Business plan – preparation of a promotional campaign for one's own “product” on social media.
- Team communication – creation of a private project group (e.g., on Messenger or Instagram) as a workspace.

3. METHODS FOR ASSESSING STUDENT WORK WITHIN COLLABORATIVE LEARNING FOR DIGITAL COMPETENCIES

3.1 Rubric-Based Assessment



How Does It Work**:**

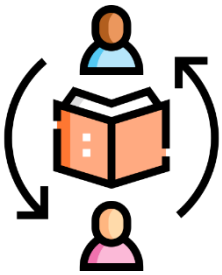
- Create a rubric outlining expectations for different aspects of the project.
- Criteria may include research quality, digital tool usage, creativity, collaboration, and presentation skills.
- Use a point scale (e.g., 2-5) to grade each criterion.

Example:

Criteria	Excellent (5)	Good (4)	Needs Improvement (3)	Poor (2)
Research & Accuracy	Uses reliable sources, well-researched	Mostly reliable but lacks depth	Some sources are questionable	No credible sources
Creativity & Design	Highly engaging and visually appealing	Good use of visuals and layout	Basic design, lacks engagement	Poor layout and visuals
Use of Digital Tools	Advanced use of multiple digital tools	Good use of at least one tool	Basic digital tool usage	No digital tools used
Collaboration & Teamwork	Excellent communication and contribution	Some collaboration issues	Uneven workload among members	Poor teamwork
Presentation & Delivery	Clear, well-structured, and engaging	Mostly clear but lacks engagement	Some parts unclear or rushed	Disorganized and unclear

Why Does It Work: Clear grading expectations for students. Encourages balanced development of research, digital literacy, and collaboration.

3.2 Peer Assessment



Peer assessment is a process whereby students grade each other's assignments or tests, based on a teacher's benchmarks. The practice is employed to save teachers' time and improve students 'understanding of course materials and to improve their metacognitive skills. Peer assessment can empower students to take responsibility for, and manage, their own learning; enable students to learn to assess and to develop life-long assessment skills; enhance students 'learning through knowledge diffusion and exchange of ideas; motivate students to engage with course material more deeply (Source: Adapted from Wikipedia; Cornell University Centre for Teaching Excellence, www.cte.cornell.edu/).

Students benefit from learning about the experiences and ideas their classmates share. For example, group chats / monthly online meetings developed into formalized web-based meetings using tools such as Blackboard Collaborate, WizIQ, Adobe Connect etc. might provide a strong venue for dissemination of information, interactive discussions as well as team building activities.

3.3 Digital Portfolio



Assessment portfolios can be characterized as artifacts that convey a student's cumulative growth, activities and productions (Lui et al., 2020). As an assessment tool ePortfolio captures evidence of student's learning over time. It is a curated *collection* of artifacts documenting the development of skills and knowledge over time and across spaces (Peppler and Keune, 2019).

Students begin their ePortfolios at admittance of the course and post regular updates adding artifacts of their choice to demonstrate the skills. However, they not simply submit an artifact that meet the criteria of each skill, it is important also to produce a written reflection with each artifact. Thus, digital ePortfolios are usually situated within everyday practice since students must record what they are already doing as part of their ongoing work.

Students might utilize individual personal website builders such as Google Sites and Weebly to build their ePortfolios. Their ePortfolios might include embedded audio and video files, photo galleries integrating Prezis, and Flipagrams, in addition to traditional text-based files. This flexibility in the tool affords personalization and technology integration to enhance the learning experience. Students might also be given some autonomy in the design of their portfolios, albeit within the broad framework, and to determine the content to be selected for placement in the platform.

Example of basic guidelines of portfolio assignment for students working on e-textiles project makers (Lui et al., 2020).

Tools: e-Book format, using Apple's iBooks authoring application.

Topics to be addressed: (1) uses of e-textiles in society (2) the overall class assignment, (3) the design, (4) crafting, (5) circuitry, and (6) coding of their project, (7) a video demonstration and explanation of the final product itself, and both a (8) pair and (9) individual reflection.

Important aspects to be included: 1) in-progress images, 2) discussions of challenges faced, and 3) "tips" for others e-textiles makers.

Note: You have the freedom to address and organize the required topics however you wish, whether together or in separate sections.

There should be a clarity from both instructors and students about the eventual purpose of the portfolio the appropriate materials that students should include to support this goal, as well as specific standards for evaluating this content (Lui et al., 2020). Instructor should be explicit about the actual evaluative purpose of portfolios, and to work collaboratively with students on creating shared or "public criteria" through which to judge their effectiveness. By clarifying this purpose with students, they can not only have more agency in the process but also work to develop their own sense of what counts as effective computational communication (Lui et al., 2020).

The benefits of an e-portfolio typically derive from the exchange of ideas and feedback between the author and those who view and interact with the e-portfoli (Lorenzo and Ittelson,

2005, p. 2). The ability to create dialogue within the ePortfolio through comments results in ongoing communication among students and educators, or even peers (in the case of open account). Through feedback and conversation, educators encourage students to add and reflect on work that goes beyond their best work. It is worth noting that recognition is a driving factor behind sustained portfolio practices (Peppler, and Keune, 2019). Additionally, in the case of a private personal account, it is suggested to hold a presentation of learning web meeting to reflect and showcase ePortfolio at the conclusion of the course (Cote and Emmett, 2015). As part of the showcase students might explore personal areas of strength and passion.

The benefits of ePortfolios also derive from engagement in the process of portfolio creation (Cote and Emmett, 2015). The reflective pieces (text-based documents, images, or video files, all supplemented by a brief written reflection) provide students with an important opportunity to consider themselves as learners. Thus, portfolios increase students' ownership of learning and responsibility for learning while making it possible to compare and contrast one's best achievements. Students also can develop a deeper understanding of the competency requirements and see a variety of possible ways to demonstrate their competence, thus strengthening their ability to connect their own experiences to the goals of the course curriculum. Furthermore, these kinds of assessments promise to show individual, group, project, and organizational learning (Peppler, and Keune, 2019).

To help scaffold portfolio documentation, it is important to provide a backend platform with templates, tips for portfolio entries, and links to adult portfolios for inspiration. There is also a need for a framework that specifies the levels of reflection at which students operate. Students need to be provided with the requisite tools to reflect on including theories, concepts, experiences and an understanding of the different types of reflection. Moreover, it is important to consider how existing teacher consultations focused on developing and troubleshooting the project's product could also be used to support ongoing documentation and reporting. This would not only highlight the kinds of problems students deal with throughout the process of creating an artifact but also shed light on their thinking about how they remember and record these moments while they are occurring.

The effectiveness of digital portfolios lies in the way how it allows students to document their practice, and how it encourages self-evaluation. Reflective practice through digital

portfolios can deepen and integrate learning, advance higher-order thinking and help construct purposeful identities (Chye et al., 2021). Digital portfolios support the possibility for youth to capture their work on an ongoing basis online in ways that highlight and value engagement that would otherwise be overlooked. This is particularly important for youth who traditionally do not have a positive and high-quality record of their work and engagement online. ePortfolios also provide multiple data points that demonstrate an individual's competency in applying disciplinary knowledge to real-world problems (Peppler, and Keune, 2019).

The advantage of portfolios is that they are better able to capture a more holistic view of student understanding and learning because they focus on process alongside product (Paulson et al., 1991). Portfolios provide more authentic opportunities to document the trajectory of students' learning and practices in everyday contexts (Lui et al., 2020). One major affordance of portfolios is their use as a formative assessment that can allow teachers to monitor and assist students along the way, and students to document and shape their own pathways of learning. E-portfolio also serve as an *administrative tool* to manage and organize work.

TO CONCLUDE, the ePortfolio is considered to be an invaluable asset to student learning, an effective space to encourage and demonstrate personal growth and reflection. The multimedia capability of ePortfolio allows students to include multiple formats and contexts—documents practice (e.g., link, reflection, video) reflecting on their learning.

3.4 Self-Assessment & Reflection



Self-assessment involves the ability to be a realistic judge of one's own performance. Proponents of self-assessment suggest it has many advantages, for example, it: provides timely and effective feedback and allows students to assess their own learning quickly; allows instructors to understand and provide quick feedback on learning; promotes academic integrity through student self-reporting of learning progress; promotes the skills of reflective practice and self-monitoring; develops self-regulated learning; increases student motivation; improves satisfaction from participating in a collaborative learning environment; helps students develop a range of

personal, transferrable skills to meet the expectations of future employers (Source: Cornell University Centre for Teaching Excellence http://www.cte.cornell.edu)

How Does It Work:

- Students complete a self-assessment form reflecting on their contributions and learning.
- The reflection is graded based on depth, honesty, and self-awareness.

Example Reflection Questions:

- What digital tools did you learn and use effectively?
- What challenges did you face, and how did you overcome them?
- How did you contribute to teamwork and collaboration?
- What would you improve in your next digital project?

Why Does It Work*:* Develops self-awareness and responsibility. Encourages students to take ownership of their learning.

4. REFERENCES

1. Aldabbus, S. (2018). Project-based learning: Implementation and challenges. *International Journal of Education, Learning and Development*, 6(3), 71–79.
2. Chiu, C. F. (2020). Facilitating K-12 teachers in creating apps by visual programming and project-based learning. *International Journal of Emerging Technologies in Learning* (Ijet), 15(01), 103. https://doi.org/10.3991/ijet.v15i01.11013
3. Chye, S., Zhou, M., Koh, K., and Liu, W.C. (2021) Levels of reflection in student teacher digital portfolios: a matter of sociocultural context? *Reflective Practice*, 22:5, 577-599, DOI: 10.1080/14623943.2021.1937976
4. Cote, K., and Emmett, T. (2015) Effective Implementation of ePortfolios: The Development of ePortfolios to Support Online Learning. *Theory Into Practice*, 54:4, 352-363, DOI: 10.1080/00405841.2015.1077642
5. Deep, S., Salleh, B. M., & Othman, H. (2019). Improving the soft skills of engineering undergraduates in Malaysia through problem-based approaches and e-learning applications. Higher Education, Skills and Work-Based Learning, 9(4), 662 676. http://doi.org/10.1108/HESWBL-07-2018-0072
6. Fritz, R., & Marchewka, M. (2024). Transformative learning: Investigating perspective changes towards developing global human resources in a virtual exchange project. *Innovations in Education and Teaching International*, *61*(2), 370-384.
7. Hinton, J. (2022). Project-based learning challenges. https://www.jeffreyahinton.com/post/project-based learningchallenges.
8. Lambert, J. (2002). Digital storytelling. Capturing Lives, Creating Community. Berkeley: Dig ital Diner Press. Second Edition 2006, Third Edition, 2009.
9. Lorenzo, G., & Ittelson, J. (2005, July). An overview of e-portfolios. Retrieved March 13, 2015, from https://net.educause.edu/ir/library/pdf/eli3001.pdf.
10. Lui, D., Walker, J. T., Hanna, Sh., Kafai, Y.B., Fields, D., and Jayathirtha, G. (2020) Communicating computational concepts and practices within high school students 'portfolios

of making electronic textiles, *Interactive Learning Environments*, 28:3, 284-301, DOI: 10.1080/10494820.2019.1612446

11. Pan, H. W., Chen, N., and Wiens, P. D. (2022). Teacher professional development and practice of project-based learning in Taiwan: The moderating effect of self-efficacy. *Asia Pacific Journal of Education*. https://doi.org/10.1080/02188791. 2022.2114423
12. Peppler, K., and Keune, A. (2019). "It helps create and enhance a community": Youth motivations for making portfolios. *Mind, culture, and activity*, 26 (3), 234–248. https://doi.org/10.1080/10749039.2019.1647546
13. Robin, B. R. (2008). Digital storytelling: A powerful technology tool for the 21st century classroom. *Theory into practice*, *47*(3), 220-228.
14. Saad, A., and Zainudin, S. (2024) A review of teaching and learning approach in implementing Project-Based Learning (PBL) with Computational Thinking (CT). *Interactive Learning Environments*, 32:10, 7622-7646. DOI: 10.1080/10494820.2024.2328280
15. Sernbo, E., Sjöström, M., and Rademaker, A.L. (2024) Developing international virtual student exchange to enhance theory-practice transfer. *Social Work Education*, 43:4, 1110-1122, DOI: 10.1080/02615479.2023.2167199
16. Voinohovska, V., Tsankov, S., & Goranova, E. (2019). Development of the students ' Computational Thinking skills with Project-Based Learning in scratch programming environment, 5254–5261. https://doi.org/10.21125/inted.2019.1309