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Play your way into production: game-based skills development for the film and TV industry

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ABSTRACT

Screen industry employers report that they are unable to recruit graduates with the right skills for entry-level roles in film and television, citing a lack of business awareness and various “soft skills” as barriers to employment. Traditionally, such knowledge and skills are obtained through in-person work experience on set, but work experience is usually unpaid and therefore inaccessible to many. However, recent research in the use of applied/serious games has indicated that situational skills training can be facilitated through these approaches. This article offers an analysis of the design process behind a game-based learning intervention and offers preliminary results, drawing on questionnaire responses, interviews and an autoethnographic account. We argue that a serious game can function as a meaningful intervention, allowing potential new entrants to the screen industry to understand the tasks and duties of particular job roles and improve access to the development of skills and knowledge.

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Serious games; educational games; skills gaps; screen industries

Introduction

Skills training and work-readiness in the UK screen industries has been a topic of concern, debate and research for many years (Carey et al., 2017; Creative SkillSet, 2014). Around 106,000 people were employed in the UK film industry in 2021, with the production workforce rising from 45,000 to 84,000 between 2012 and 2021 (BFI, 2022) but persistent shortages in crew (ScreenSkills, 2021) have resulted in skills gaps and shortages, where “employers are unable to fill key vacant posts due to a lack of suitable candidates” and “the extent to which workers lack the skills necessary to perform their current jobs” (McGuinness et al., 2017, p. 8). A skills audit by the BFI (2017) revealed that both employers and the workforce had raised concerns regarding the provision of education and sector-specific skills training in the UK, a finding confirmed by ScreenSkills (2021) which recognized persistent shortages in areas such as production management, editors and storyboard artists. With film and TV production continuing to grow, it is estimated that the UK screen industry will require between 15,130 and 20,770 additional full-time equivalent employees (FTEs) by 2025 (ScreenSkills/Nordicity/Saffery Champness, 2022), thus adequate skills and training provision is needed not only to

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ensure that the industry has the talented workforce it needs to fulfil demand for production, but to address the skills gaps and shortages that currently exist.

Skills gaps/shortages in film and TV

A range of issues have been identified as contributing to skills gaps and shortages in the film and TV industry, some of which have been reported for a number of years, and often have their roots in ingrained historical working practices, whereas others have appeared or become exacerbated more recently. Skilled workers may leave due to poor working conditions (Ozimek, 2021); older workers “age out” of the workforce with their relevant knowledge and networks being lost (Hughes & Webber, 2023); early career workers are promoted before they have the required skills, resulting in a skills shortage throughout the career chain (Jones et al., 2022); and the freelance nature of many roles means that skills gaps and shortages pose real threats to the continued success of the UK screen sector (J. P. Allen & de Grip, 2007; BFI, 2023; Van Loo et al., 2001). More recent difficulties can also be seen as a result of the UK’s exit from the European Union or aftermath of the COVID-19 pandemic. The 2021 ScreenSkills Assessment (ScreenSkills, 2021) found that nearly 38% of employers felt COVID-19 had made it more difficult to offer on-the-job training and support for new entrants, while the uncertainty around the industry caused by the pandemic increased the likelihood that vulnerable workers would leave to find more secure employment elsewhere, thus creating further skills gaps (Raising Films, 2021). Brexit has seen changes to funding models and visa requirements that have negatively impacted the UK’s film and TV sector. As O’Carroll (2023) points out: “The post-Brexit points system immigration system has, by design, made it more difficult for those without qualifications to move to the UK to work” as skilled workers from outside the UK may not have the paper qualifications to grant them entry to the country to work in the sector. In addition to these changes, rapid advancements in technology are also redefining media practices and in turn, the skills needed by the industry. Virtual production, for example, a new way of creating film and TV content where virtual environments are captured in real-time “in camera,” rather than added in post-production (Willment & Swords, 2023), will require crews that are trained to work with these new technologies

Generally, and certainly in a UK context, much of the focus on skills gaps relates to the technical skills that are needed to perform a specific role. A 2014 Film Employer Panel identified skills gaps in prosthetics, sound recording and health and safety awareness (Creative Skillset, 2014), shortages that were again highlighted in a 2017 skills audit of the UK screen industries (Carey et al., 2017). The 2017 British Film Institute (BFI) Future Film Skills Action Plan highlighted that changes in technology were continuing to drive skills gaps, an issue that was still visible in the latest BFI (2022). The 2017 Work Foundation skills audit asked respondents about the preparedness of new entrants to the sector, talking about the concept of being “set ready” rather than discussing specific job or technical skills. Being set ready involved the following:

Soft skills, variously referred to as “personality,” “having the right attitude,” but also to “have initiative” and “be a self-starter”

Technical engagement was seen as very important, particularly in front-line technical production and post-production roles

Broader knowledge of the film and screen industries and the production process

Ability to work collaboratively and excellent communication skills. (Carey et al., 2017, p. 22)

This emphasis on “soft skills,” communication and working collaboratively was also highlighted in the 2021 ScreenSkills Assessment (ScreenSkills, 2021), where some of the gaps which employers identified as existing among junior crew were professional skills such as teamworking, inter-personal skills and resilience (2021, p. 5), and the 2022 BFI skills review. The definition of soft skills in much of the previous research is vague, and Jones et al. (2022) suggest they are instead referred to as professional skills, noting the tendency to view soft skills as secondary to technical skills. Indeed, research carried out by Jones et al. (2022) identified the continuing need for professional skills among those working in film and TV, with one Higher Education (HE) lecturer noting that:

the majority [of our employer forum] said that they value soft skills more than practical skills ... the exceptions were where there are people, for example, from really small independent production companies where they want people that can shoot a bit, edit a bit. But interestingly the majority of people have said that it's actually much more about people skills, and initiative, and can-do attitude ... The way that my research came out suggested that HEs generally have got more to do on the soft skills front and the job hunting fronts than the job doing front” (quoted in Jones et al., 2022, p. 10)

Research states that the industry repeatedly calls for new entrants to have better interpersonal skills but despite the many practical further and higher education courses and training programs available, employers and the workforce state that these do not always provide the skills required (Animation, 2018; BFI, 2017; ScreenSkills, 2019). In particular, training was criticized for not providing the professional skills required in the workplace, including team-working, communication and confidence.

Training provision in the film and TV industry

Structural shifts in the sector over the last two decades have seen dramatic changes take place in relation to skills development. Prior to the 1980s British television was traditionally dominated by broadcasters who facilitated skills development and offered employees job security (Grugulis & Vincent, 2009). Indeed, until the mid-1980s there were only three recognized routes into the industry, with only two of those incorporating formal training: entering the industry via friends or family already working there; attending the National Film School or the BBC's new entrant schemes; or undertaking a degree course (Cowle, 1989). Those entering the industry via these routes were offered what was essentially a structured apprenticeship, providing training and mentoring while also enabling workers to develop their broader knowledge about the industry (Jones et al., 2022). The publication of the Peacock Report suggested that “the broadcasting industry was wasteful of resources through over-manning and self-indulgent working practices” (Peacock, 1986, p. 532) and the de-unionizing of the sector saw a shift to the casualization of employment and the increased use of freelance labor which in turn led to a decrease in training budgets (Antcliff et al., 2007). Polytechnics in the late 1970s had begun teaching specialist technical skills such as video engineering, but as Cowle notes, “In virtually all cases ... the course emphasis lay

on education rather than vocational training; graduates of such courses were rarely sufficiently skilled to be immediately employable without further training” (1989, p. 233).

The publication of a national film skills training strategy by Skillset and the UK Film Council in 2003 attempted to address the lack of courses delivering vocational skills to equip students to enter the industry by identifying a “select number of practice-based higher education film courses throughout the UK that provide the skills, knowledge and experience needed for individuals to confidently enter the industry direct from education” (Skillset/UK Film Council, 2003, p. 18) and creating “a limited number of recognised centres of excellence to provide appropriate, high-quality and relevant training” (Petrie, 2012, p. 366). The strategy stated that there was “a clear distinction to be made between academic study and vocational provision” (Skillset/UK Film Council, 2003, p. 17), with a clear inference that it is “vocational provision,” rather than “academic study,” which would serve to fill the skills gaps identified by the industry. The distinction between academic and vocational education is still recognized nearly twenty years after the publication of the Skillset/UK Film Council strategy, contributing to the confusion as to where responsibilities lie for the development of sector skills (Jones et al., 2022)

The 2017 Work Foundation report on skills expressed mixed views on the quality of training within the screen industries, noting that there were a multitude of offerings but a lack of cohesion. This is reiterated by Jones et al. (2022) who identified 1,005 different types of training, including undergraduate and postgraduate degrees, events, HNC and HNDs, workshops, program-specific training, coaching, online modules, podcasts and development programs.

Despite identifying the need to better prepare graduates of educational programs to enter the industry, the lack of “set readiness” of those entering the industry still remains. Training provision in the screen industry thus varies “widely from nationally accredited and recognised courses such as courses provided by the National Film and Television School (NFTS) to informal learning provisions during meetups, workshops or game jams” (Ozimek, 2021, p. 25) and this fragmentation makes it increasingly difficult for those who are interested in joining the sector to both find training and understand what skills might be required of them at each stage in their career. Additionally, there are often barriers to developing these skills for under-represented groups, compounded by the prevalence of “on-the-job” training, which is often obtained through unpaid work experience or internships which are inaccessible to many (Jones et al., 2022). Research into film/media qualifications in the UK indicates that even those registered on formal programs of study face difficulties in securing work placements (K. Allen et al., 2013; Zborowski et al., 2024).

Use of applied games for training

Before the widespread adoption of computer games, researchers recognized the value of play to improve film-making skills (Mukerji, 1977). Commercial Off the Shelf games from *Hollywood Pictures* (Starbyte, 1995) to *The Movies* (Lionhead Studios, 2005) to *Movies Tycoon* (PixelCraze, 2024) have taken a light-hearted approach to representing the film industry. Recent research has indicated that situational skills training can be facilitated through the use of applied/serious games and XR technologies. Connolly et al. (2012) found that playing computer games is linked to a range of perceptual, cognitive, behavioral, affective and motivational impacts and outcomes while Ebner and Holzinger argue

“games are often closer to simulating real-life experiences than more traditional educational media” (Ebner & Holzinger, 2007, p. 875). Game-style simulations are often-used in training contexts where “virtual” mistakes do not have the risks associated with critical impact of errors made in the real world, especially in medical and health contexts (Chen et al., 2020; Shorey & Ng, 2021).

With advancements in game engines like Unreal Engine and Unity, game development environments provide a virtual sandbox where learners can experiment with camera operations, scene composition, and even editing, replicating the complexities of a live production environment without the associated costs.

In combination with modeling and animation software such as Blender or Maya, students can further hone their practical production skills by learning the intricacies of virtual cameras. These programs allow users to manipulate depth of field, focal length, and camera movements, providing direct parallels to real-world film equipment. For instance, a student might animate a camera tracking shot or simulate crane movements, gaining technical proficiency before stepping into a physical studio.

Other examples of “repurposing” software to develop production skills include the use of Machinima – a technique that leverages video game graphics engines to create cinematic productions. Through games like *The Sims* or *Grand Theft Auto V*, learners can practise storytelling, camera placement, and scene blocking. Machinima acts as a practical exercise in directing and cinematography, enabling users to learn camera framing, shot composition, and movement in a 3D space, much like they would on a film set but with more flexibility and lower stakes (Payne, 2011).

Games have also been shown to foster soft skills crucial to the media industry. Collaboration, communication, and problem-solving are central to game-based learning environments. Greitemeyer and Osswald (2010) have demonstrated that cooperative game-play enhances prosocial behaviors, which are directly transferable to teamwork in film production. Additionally, platforms like *Minecraft* are used to simulate media production workflows, enabling students to practise project management and collaboration in a controlled, yet dynamic setting (Short, 2012).

As De Freitas (2006) notes, the social interactive dimension of game play can support leadership, coordination and communication skills. *World of Warcraft* (a massive multi-player online role-playing game), often requires players to work in teams, and research into the game has shown how collaborative skills can be improved (Wang & Chen, 2012). Again, *Minecraft* has also been used in schools to support learning across the curriculum, which Hewett, Zeng and Pletcher point out promotes student “development, practice, and refinement of Four Cs skills” that “ultimately helps prepare students for college and the workforce” (Hewett et al., 2020, p. 361).

Educational games have been used in HE institutions to enable connections to be made between theory and practice. In 2000, Glasgow Graduate School of Law at the University of Strathclyde developed a virtual community which they used in their professional legal practice training course (Maharg, 2004). Based in a virtual town, a range of businesses, utilities, agencies and government organizations etc. provided the backdrop for the course. Students were divided into “firms” of four trainee solicitors and required to undertake a number of transactions on behalf of their virtual client, such as the purchase and sale of a house, winding up of an estate for a private client, personal injury negotiation. Maharg found that the game proved a very useful way of

facilitating negotiation skills, with students noting in their reports that they needed to take a more analytical attitude to facts and the law, while interpersonal skills like delegation and teamwork were seen as a focus of learning. Similarly, lecturers at Graz University of Technology developed a bespoke civil engineering game designed to supplement lectures (Zechner & Ebner, 2011). The game provides problems based around structural theory which students have to solve in a specific amount of time, with levels of difficulty represented by different structures like simple beams, cantilever games and arched hinges. Analysis of students' posttest results suggested that there was a significant improvement in the learning outcome of *all* students in general. When providing oral feedback students called the game “addictive” and “well done” and felt that it had been a “great learning-tool.” Given the possibilities offered through educational games coupled with issues around accessing work experience and on-set training in the film and TV industry we designed and developed an educational game – Play Your Way Into Production – primarily for use in further and HE settings. Play Your Way Into Production is the first game of its kind to offer a gamified simulation of the experience of working on a TV set and is designed to help develop a range of professional and situational skills which might otherwise be traditionally gained through work experience. The game deliberately avoids trying to address practical skills such as camera operation or sound recording techniques in order to concentrate on the interpersonal skills required to act confidently and competently within a production crew on set,

Co-creating play your way into production

The collaboration

Play Your Way into Production¹ is a collection of digital educational resources to support skills development and employability for new entrants to the screen industry workforce, and comprises:

- A scenario-based educational game based around a virtual TV studio
- A VR experience that allows users to explore and interact with the virtual TV studio, which includes detailed information the studio equipment and roles of crew members
- Downloadable “character cards” outlining all the crew members who appear in the game detailing their skill-sets, roles and responsibilities
- Short filmed interviews with film/TV students and recent graduates working in the industry
- A freely available Educational Resource Package (ERP)² for educators with suggested learning activities focussed on the skills and competencies developed in the game

Play Your Way Into Production (PYWIP) was co-created through an interdisciplinary collaboration between academic researchers and an independent production company under the auspices of the skills and training workstream of the Screen Industries Growth Network (SIGN).³ The production company One to One Development Trust⁴ is an independent charitable arts organization who use film, game and extended reality (XR) to break down barriers and increase opportunities and aspiration.

Research-led design

An academic advisory board of researchers from UK HE Institutions steered the development and design of the materials to ensure that it was underpinned by relevant research on a) previously identified skills gaps in the screen industry and b) the design of educational games and active-learning pedagogies. A structured series of academic advisory board meetings in collaboration with the game development team ensured that academic input could be considered throughout the design and development process. This allowed the game development to be actively and responsively shaped by practical, up-to-date learnings from reflections on the experience of teaching students in film and TV production courses. In addition, this collaborative approach facilitated the immediate and timely incorporation of insights from research being undertaken simultaneously by the SIGN team on skills gaps and training needs in the UK film and TV industries.

Identified skills gaps

Previous research conducted through SIGN carried out 27 semi-structured interviews with a range of screen industry stakeholders, including training providers, production companies and employers, identified a number of themes relevant to new entrants in the screen industries (Jones et al., 2022; Willment et al., 2024). The most salient of these were:

- **Attitudes** - some new entrants refused to accept criticism or suggestions for further improvement as they had obtained an undergraduate degree and felt they knew all they needed to.
- **Industry knowledge** - a perception among training providers was that graduates knew how to write, edit or operate a camera but didn't understand the industry as a whole or how different roles worked together.
- **Mental health and wellbeing** - the industry can be demanding with long hours and high expectations and knowing about these issues as well as how to maintain a work-life balance and be resilient was identified as important.
- **Professional skills** (a.k.a. soft skills) – knowledge, and specifically technical knowledge, was seen as less important than being able to work in a team, communicate effectively or be assertive.

The skills gap areas identified here, which echo those identified in recent focussed research (e.g. Animation, 2018; BFI, 2017, 2023; Carey et al., 2017; Jones et al., 2022; ScreenSkills, 2019) formed the framework of skills that the game would seek to develop and underpinned the curation of scenarios for the situational learning approach adopted. We chose not to work with industry professionals on the design of the game in order to focus on the skills gaps identified by other research and avoid developing a game that is particular to only one studio's needs.

Game design principles

Games design theories are closely associated with the design and rationale for game-based learning. Gee (2003, 2007) asserts that good games incorporate good learning principles, which are supported by current research in cognitive science. The PYWIP

game was developed around a selection of design principles chosen to support and underline the overall aim of situational learning and skills development as it aims to facilitate awareness and familiarization of the studio environment, work practises and professional relationships rather than teach players how to use specific items of kit. The design principles chosen were:

- **Agency** (Murray, 1997) is the process of self-discovery and player autonomy. In good games, players are in control; they seek out tasks and decide how best to achieve them, and, when faced with conflict and combat, learn how to overcome them.
- **Stored simulations** (Gee, 2003; Reeve, 2011) In games players form mental associations and make connections between “stored simulations” of previous experiences and adapt and apply these to new experiences. In cognitive terms, this is pattern recognition – the process of forming associations between objects. This applies to experiences and situations within a single game, as well as developing experience that translates to subsequent game titles.
- **Reflection** (Iacovides et al., 2022) is an important first step for addressing attitudes and supporting behavior change, but often overlooked in game-based learning. Providing players with an opportunity to role-play within a relevant context promotes reflection.
- **Situated Cognition** (Brown et al., 1989) argues that knowledge is fundamentally linked to the activity, context, and culture in which it is developed and used. They critique traditional educational practices that treat knowledge as abstract and detachable from situations, suggesting that this limits the effectiveness of learning. The idea of “cognitive apprenticeship” as a way to better integrate learning with specific contexts. This method aims to make full use of the social and physical contexts to enhance learning, emphasizing that skills should be taught in authentic situations that reflect how the knowledge will be used in real life. Comparisons between simulation-based training and lecture-based education in teaching situational awareness have shown that simulations are more effective, particularly in improving perception skills essential for time-sensitive, critical decision-making roles (Chang et al., 2017; Zarraondia et al., 2015).

The play your way into production game

The PYWIP game is set in a virtual film/TV studio where the fictitious Pink Sprout Productions are making a CGI-rich dinosaur documentary. The game features a film studio populated by 17 crew members with varied backgrounds and experience, a green room containing a kitchen area and office equipment, and an outside area with a catering van. Small details were intentionally included to enhance the studio context including real posters on the corridor wall, changes in the weather, and the in-game camera monitor playback screen reflecting the scene being filmed (*situated cognition*).

Players are given a number of tasks to complete and scenarios to navigate that reflect some of those that might be encountered when working on set (*stored simulations*) all of which are based on the lived experience of those working in the industry. The game-play takes place over the course of a day – morning, afternoon and evening – and each phase is triggered following the completion of a set number of tasks. Players are presented with a number of options as a response

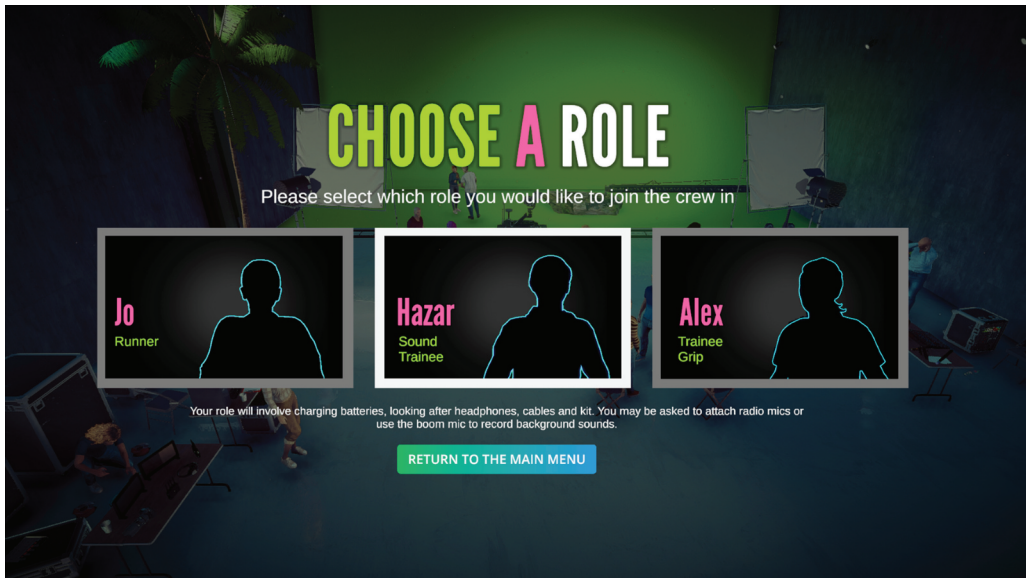


Figure 1. Roles participants can choose to play.

to each scenario-based task, one of which can be to ignore the request. Some options trigger immediate feedback (e.g. choosing to “google” a piece of information results in a reminder that there is no phone signal in the studio) whereas most result in game-play continuing (*agency*). Feedback on player interactions with characters in the game, and all tasks and scenarios encountered is summarized when the player receives an appraisal at the end of the game from their line-manager.

As well as playing the game, players can explore technical equipment and props; selecting an item brings it up in 365 degree view mode with text-based info on its specification and uses (Probing). While exploring the set, players are able to eavesdrop on conversations between other characters/crew-members about different aspects of working in the industry (Industry Knowledge).

The game offers players a choice to play as one of three different entry-level roles – a runner, a sound trainee or a trainee grip – all of which allows them to experience different elements of working on a set, undertake various tasks relevant to the role and interact with different characters (see [Figure 1](#)).

Requiring players to choose a role supports and encourages player reflection by a) providing relevant context for the role and thus the tasks they are likely to encounter and b) offering some distance from their own personal, subjective identity (cf. Iacovides et al., 2022). Interactions with non-playable characters (NPCs) form the basis for tasks players were required to complete. These are presented as scenarios in which the player is presented with a request and options to choose from, some of which affect the immediate storyflow ([Figure 2](#)) and all of which affect the feedback offered (reflection, situated cognition) to players at the end of the game ([Figure 3](#)).

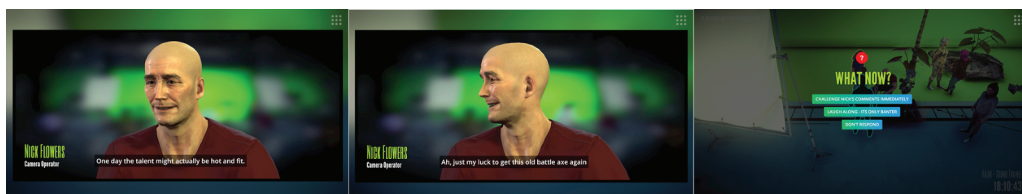


Figure 2. Scenario participants were faced with while playing as Hazar.

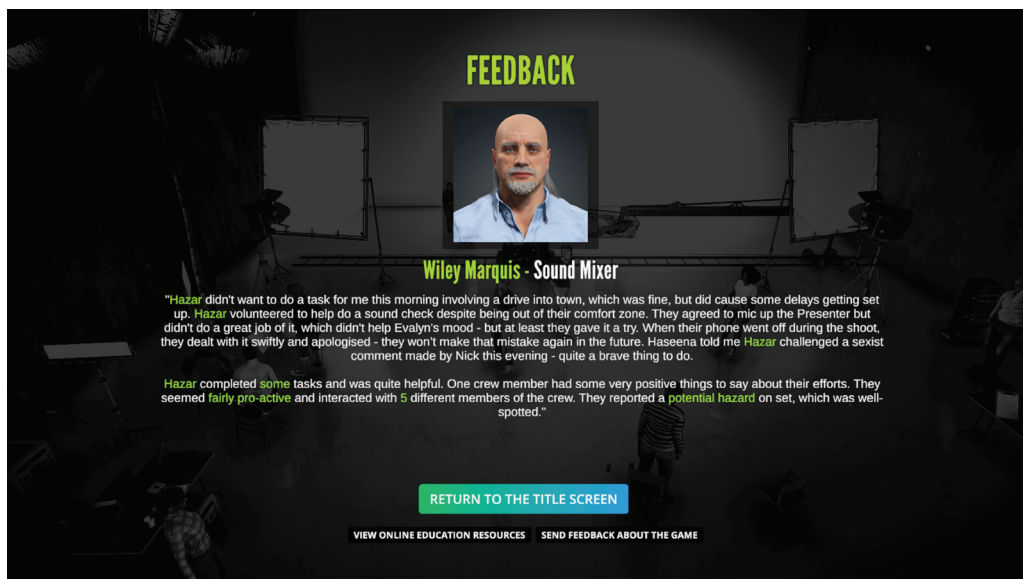


Figure 3. Feedback offered to participants playing as Hazar dependent on scenario options selected.

PYWIP Educational Resource Pack

An Educational Resource Pack (ERP) was developed to support further reflection and understanding around the skills and competencies highlighted in the PYWIP game.

The ERP was designed with three “learner personas” in mind: an “independent learner” who wants to know more about getting into the screen industry; an “educator” working with a group of students at school/college/university; an “industry professional” who might use the resource to support EDI work within their organization. The design and development of the ERP was co-created by educators and student learners, through a series of game development open sessions, input from the Academic Advisory group, and a focussed teaching resource co-development session, to which students and staff were invited.

The ERP (<https://subjectguides.york.ac.uk/PYWIP-ERP>) includes:

- A brief overview of the characters that players encounter in the game
- An individual online “professional skills audit” which learners can complete before and after using the game/ERP (see [section 3](#) for more details)

- A description of the game scenarios and the skills and competencies to which they seek to develop
- 11 themed learning 'modules' that focus on developing specific competencies link to the game scenarios
- Links to curated external web-based resources for further consideration

Link to competencies

The ERP was developed in response to finding from our previous research on skills gaps in the UK film and TV industries

The industry repeatedly calls for new entrants to have better interpersonal skills such as team working, communication skills and confidence – the “soft skills” discussed in this section. But these skills are difficult to learn, especially for those from under-represented groups who already face barriers to starting and developing a career . . . (Jones et al., 2022, p. 10)

Based on this research nine key competencies were identified – Teamwork, Initiative, Self-motivation, Assertiveness, Leadership, Working under pressure/coping with stress, Self-awareness, Decision making, Communication – and mapped to the playable scenarios included in the PYWIP game (see [Table 1](#)).

Learning modules

The resource pack includes 11 discrete learning modules, with each suggested module activity lasting approximately 50 minutes. To keep the learning experience engaging, we included suggestions of gamified activities that help explore and apply the theme of each module. The ERP is designed to be used flexibly by learners and educators as the learning modules can be used in any order, and can be used in combination with other modules or individually as required.

Evaluation of the play your way into production (PYWIP) game and Educational Resource Pack (ERP)

Methodology

A inductive/deductive hybrid thematic approach (Proudfoot, 2023) was used to evaluate the experience of students and lecturers using the PYWIP game and the ERP in a UK HE setting, through collecting data within teaching sessions, an auto-ethnographic account and interviews.

Lecturers (L1 and L2) at two HE institutions were asked to identify an existing module, such as one focused on professional practice, media, culture and the creative industries, or media methods, from current undergraduate BA degree programs, in which they could teach a seminar based on the PYWIP resources. They were given free rein to choose which resources from the ERP to use and how they wanted to use them, based on their knowledge of their students' abilities, their own interactions with industry and their preferred teaching style. Students were informed that they did not have to take part in the research, and if they did take part that there was no right or wrong feedback, or expectation that students would view the game positively.

Table 1. Example mapping of game scenario to professional skills competencies in the ERP.

Scenario	1- Find the C-stand	2 - Feeling on the outside	5- Working the Photocopier
<i>Main playable Character</i>	Jo - Production Assistant	Jo - Production Assistant	Hazar - Sound Assistant Trainee
<i>Teamwork</i>	<i>By facilitating the workflow to the crew as the tools will be where needed.</i>	<i>Being proactive, maintaining open communication channels, follow the plan</i>	<i>Helping out to get the job done together, "having the team's back."</i>
<i>Initiative</i>	<i>Action to get the job done, by Googling what a C-stand is or asking for guidance.</i>	<i>By offering a hand to different departments (rigging gear, organising props, testing devices, etc), projecting being approachable and open to give support as needed.</i>	<i>To accept the task even though it is not essentially part of their actual job. Reorganise the copies to facilitate things for Erica and the actors.</i>
<i>Self-motivation</i>	<i>to support the team as needed and learn things that might be unfamiliar to them.</i>	<i>not require an invitation to make themselves part of the circle, seek feedback from senior members of staff, ask questions to learn the craft.</i>	<i>As a soundie it's not really their role to make script copies, but it is very valuable that they can support the team with that task.</i>
<i>Assertiveness</i>	<i>Making sure that they get the right piece of gear, timely.</i>	<i>Remain grounded, focused and in constant communication.</i>	<i>Appreciate Brett's comment. Focusing on reorganising the copies without hesitation.</i>
<i>Leadership</i>	<i>Modelling initiative and self confidence to other junior crew members. Fostering trust and modelling delegating to senior crew members to ease the workflow and get the job done.</i>	<i>Offer creative solutions to challenges, share knowledge with other peers.</i>	<i>Hazar might want to give Erica, if they consider it beneficial, a heads up that the photocopier has a glitch so the next person to use it won't have the same issue.</i>
<i>Working under pressure/ coping with stress</i>	<i>Being new on set can be very daunting, so remaining open to listen for instructions and confident that they are learning and will get the job done.</i>	<i>Ability to switch to different tasks and adapt to changes in schedule while remaining grounded, motivated and focused.</i>	<i>Remaining calm and focused to reorder the copies as quickly as possible, and smoothly hand them to Erica.</i>
<i>Self-awareness</i>	<i>Identifying gaps in own skills/ knowledge and being open to learn. Being open to new experiences and potential challenges that come with starting a new job. Understanding their valuable contribution to the project.</i>	<i>Of what their role involves, boundaries of what they are expected to do and expected not to do. Knowing their own strengths and challenges.</i>	<i>Knowing the value of their role, as well as the value of giving a hand outside of their main duties. Know if they can or cannot accept taking on a task.</i>
<i>Decision making</i>	<i>To take up on the role or drop the request.</i>	<i>Awareness of risk assessment to make informed decisions, consult with supervisors before making big decisions.</i>	<i>To accept the task or not, reorder the copies or not.</i>
<i>Communication</i>	<i>Asking for clarification when/if needed.</i>	<i>Procuring to stay on the same page to avoid misunderstandings and unnecessary stress, actively listening to others, requesting clarification if needed, expressing their needs to be able to perform their role efficiently (for example, asking for an updated, printed schedule).</i>	<i>Brett's acknowledgement - assuming they know that Hazar is a soundie - of Hazar's valuable support and initiative. Hazar might realise that it is worth asking staff for more details on where a printer (or any device) is and care to read any instructions the next time they engage in a task external to their role.</i>

The taught seminar sessions were at least 120 minutes long and a total of 16 students took part. Participants were split evenly between male and female students and were in their 1st or 3rd year of study. The majority had no previous work experience in the film or TV industry despite being enrolled on a media studies course.

At the beginning of the taught seminar students were asked to complete the online skills audit (https://york.qualtrics.com/jfe/form/SV_78TLMCEcobjRdci) that we developed to provide each student with an opportunity to self-assess their own professional skills and knowledge of the Screen Industry, and to help introduce the focus of the teaching session. Our PYWIP skills audit is based on the Worklink Skills and Values Assessment Tool (WLSVA) (Dershem, 2020) a validated tool designed to measure skills development among youth and young adults, which is organized in three major Construct Groupings: “Soft Skills” (e.g. thinking and Planning Skills), “Earning Skills” (e.g. Entrepreneurship Skills) and “Civic Values” (e.g. Social Inclusion & Justice’). Five additional statements were included to gauge respondents’ knowledge and understanding of the Screen Industry specifically:

- I am aware of the variety of roles in the Screen Industries.
- I understand how the different roles in Film and TV Production relate to each other.
- I am aware of the different types of specialist equipment used in Film and TV Production.
- I am aware of the challenges that some people may face in the Screen industries.
- I am aware of the positive and rewarding aspects of working in Film and TV.

Interviews

A week after one of the seminar sessions took place we interviewed L1 who delivered the teaching session using PYWIP and the ERP. The interview lasted for 30 minutes, and was transcribed and coded using the inductive/deductive hybrid approach. Exploratory questions focussed on how they used the game, what they found useful, what ERP modules they used (if any), and if they thought the game could help students who want to work in the industry.

One interview was also carried out with an industry professional who had downloaded the game from the PYWIP website. This interview lasted for 35 minutes and was transcribed and coded using the inductive/deductive hybrid approach. Exploratory questions focussed on what skills gaps they had seen in their sector, if they used the game, what they found useful and if they thought the game could help students who want to work in the industry. This is a limited sample and we are hoping to seek further industry engagement in future to fully assess the suitability of the game in helping students to develop appropriate skills.

Analytic autoethnography

Two of the three seminars were taught by the Research Associate involved in designing the PYWIP game and ERP (L2), and as such required an autoethnographic approach to data collection. Autoethnography, as Méndez notes, “can range from research about personal experiences of a research process to parallel exploration of the researcher’s and the participants’ experiences” (Méndez, 2013, p. 281). This article follows Anderson’s model of analytic autoethnography which includes:

- (1) complete member researcher (CMR) status, (2) analytic reflexivity, (3) narrative visibility of the researcher’s self, (4) dialogue with informants beyond the self, and (5) commitment to theoretical analysis. (Anderson, 2006, p. 378)

As the Research Associate was both a member of the research team at the University of York and an hourly paid lecturer at one of the institutions where the game was used within teaching delivery, they were able to transcend “empirical data to gain insight into some broader set of social phenomena than those provided by the data themselves” (Anderson, 2006, p. 387) – in this case the use of an educational game for teaching skills required by the screen industry. They made notes on a mobile phone app during the seminar and wrote a more detailed description of the seminar, students’ reactions and their own thoughts about the game and ERP following each seminar.

Results and discussion

Results are presented here under three broad inductive themes: “*game efficacy*,” “*engagement with the ERP*” and “*contextualising the game*”. Deductive themes from the game design principles and skills gaps areas are highlighted in (**bold**).⁵

Game efficacy

Lecturers started the seminar by introducing the game and its development context to the students, who were then left to explore it on their own (**probing**). Both lecturers noted that they gave no explicit instructions on how the game should be played, but both told students to play through the game as at least one of the entry-level roles. Once they had done that they were free to play as another character or explore other aspects of the game such as the crew profiles or interviews (**agency**). Students progressed at their own pace throughout the game, with the research assistant (L2) noting that the 3rd-year students needed some more guidance due to the language barrier (the students who attended this seminar were solely international students). The other cohorts navigated the game with ease, although one 3rd year student felt that a map should be included as it was difficult to find out where they needed to go to complete certain tasks (**agency**).

Once students had played through the game at least once a break was called, and in the second part of the seminar a discussion was held around the issues brought up in the game, guided by the ERP. Asked how they used the ERP, the lecturer (L1) said:

The short version is I went in and I picked the bits that I thought were the best and would work best with my cohorts. So I wanted something that would . . . that they would see was relevant but also was potentially kind of fun. So I was kind of going for balance and engagement and a bit of information.

Students appeared engaged with the game, with several 1st year students across both seminars viewing the additional resources after they had played the game once, and felt it was a valuable tool. L1 noted that “there wasn’t any kind of cynicism toward . . . the game or the scenario, you know, it seemed like people could genuinely see this is a good way of learning about the stuff that goes beyond the technical elements of . . . a role” (**situated cognition, attitudes**) while L2 highlighted feedback from a student who said “I like how even though I played it [the game] wrong I still learned stuff.” This student deliberately chose scenario responses which were the least appropriate (agency, reflection), including

refusing to get out of the presenter's chair, ultimately being asked to leave the set but still felt that the game was helpful in developing their knowledge (**industry knowledge**).

Feedback from students was thus broadly positive: the game was “useful,” “interesting” and “good for seeing what it's like” (**stored simulations**), suggesting that the game could be an effective tool for addressing skills gaps identified by the research. Lecturers also felt that the scenarios in the game coupled with the activities from the ERP could provide students with a bank of examples or scenarios that they could use in future job interviews (**industry knowledge**).

Feedback from industry was more mixed. The game format style was criticized for being too “visually robotic,” its “Sims-like nature” and “clunkiness” making it challenging to navigate (**situated cognition**) and the industry professional (IP) felt that a top-down, 2D animation which focused on the conversations would be a better approach. The tasks were praised however, with IP noting:

not having a map worked well, because that showed that I had to use initiative, like in the beginning I had to find out where that C stand is. I've worked in a camera department, I had a rental company, I'm like, “okay, maybe it's in a truck outside” and I was like “no, actually, they would have loaded stuff in.” So that was interesting. (**industry knowledge**)

On the whole the scenarios reflected IP's personal experience, and their own knowledge allowed them to suggest additional scenarios which could aid students' professionalism, such as signing NDAs and choosing whether to take photos of stars on set (**reflection, agency**).

Engagement with ERP

Both lecturers chose elements from two different ERP modules, one covering communication and the other assertiveness, and adapted these for use in the sessions. As L2 noted:

I know the game really well and I had an idea of what scenarios might work in a session where I hadn't taught the students before and didn't know their depth of knowledge and experience. I went through the modules and decided I wanted to look at communication but I also really like the scenario between Hazar and Nick and use that to discuss different people you can communicate with if you're in that situation on set and don't feel comfortable about calling someone out. The communication and assertiveness modules had aspects I could choose to be able to include that scenario.

Students were able to highlight examples of good and bad communication (**reflection, attitudes**) within the game which were then used to facilitate discussion. Both lecturers used the “director's dilemma” exercise in which two lead actors have creative differences while filming an important scene. Students were asked to discuss how they would resolve this, what communication skills they might use and why. Students engaged with the activity, explaining why they might include the full cast and crew in the conversation, film two versions and decide which was best, or take the actors to a private room to discuss the scene, which for L1 led into a broader discussion about different management styles (**professional skills**).

Lecturers were also asked to reflect on their use of the ERP, particularly regarding whether they thought it was a useful resource to use alongside the game. L1 thought it was, not only because it was efficient and saved them time but because of the way it was structured, with high level practical skills and more in-depth scenarios (**industry knowledge**). L1 highlighted the reasons behind why they felt it was useful, saying:

before the session it was actually quite useful, partly for, like, the hyperlinks for the consent forms and stuff, I put them all on [our institution's virtual learning environment] that they could navigate through. I copied and pasted sort of judiciously chosen bits of the text from the ERP pages, you know, that gives you sort of background and categories of different kinds of communication, and so on. And I put those on [VLE] pages so that I didn't have to sort of go through it verbatim. But the students had it there and for sort of catering a little bit for neurodiversity, and so on. I wanted . . . I was sort of telling the students what we were doing, but also, if they needed it, they had it there on a page so they could go back and say, "Okay, that's what we're supposed to be doing." (**mental health and wellbeing**)

Both lecturers felt the ERP was a useful resource which could smoothly be slotted into existing modules. L1, in particular, felt that the ERP was "a bit of a gift" because the resources "slide quite easily into sessions" while L2 noted that having pre-written modules was helpful for teaching students they hadn't previously been engaged with.

Neither of the lecturers used the additional resources – such as interviews or crew profiles – provided on the PYWIP website in their seminars. However, L2 suggested them as a resource students could engage with if they finished playing the game as one character while L1 noted that some students watched the interviews without being prompted to (**agency**). L2 suggested that time was a factor:

I wanted the students to play at their own speed without rushing them. They've got the option to explore the set, pick up bits of kit and see what they're used for, as well as carrying out the tasks and while there is a timer in the game the point of it isn't to finish as quickly as possible. (probing) Asking the students to look at the other resources once they'd finished playing one character meant they could do things at their own pace, especially because I was going to spend the second half of the session going through a module (or parts of two modules) that are suggested to take 50 minutes). Maybe I prioritised the module over what I thought could have been useful? But then the crew profiles and videos are more about getting into the industry and would work better with a module like getting your foot in the door or leadership.(**industry knowledge**)

Contextualising the game

Both lecturers discussed how they had contextualized the game in relation to the research carried out by SIGN, highlighting to students that they were testing the game and how useful it was. As L2 wrote, reflecting on their session:

It was important for me to make clear my role in the development of the game and to express that we were interested in their [the students'] responses because we want to know if the game works. If not then that's a research finding in itself.

The background to the game is only briefly mentioned in the ERP introduction module, however, and isn't highlighted in any of the modules (**industry knowledge**). L1 suggested that including that either in the ERP or as a brief intro card as you enter the game could be valuable to highlight the game is grounded in what the industry needs rather than a generic skills exercise (**industry knowledge, professional skills**), making it more relatable to specific modules and to students' career plans.

Feedback from the first three seminars was therefore broadly positive from both the students and the lecturers who agreed that the game helped them address the skills gaps identified in the research. Indeed, L1 noted that was its major virtue:

imagine if you've gone through your whole degree, and this is like your first working experience. And all of a sudden, like the ground would shift beneath you. It's like, okay, so I know all this stuff about editing and camera but I don't understand the flow of working on a set. So yeah, . . . I think in that respect, that's kind of the game's USP for me in a way. (**industry knowledge, mental health and wellbeing**)

Feedback from industry also offered suggestions for situating the game in an academic context. IP felt that the game was too basic for anyone who has been on more than 2 or 3 film sets but could work as part of a year one degree course accompanied by set experience, as "If you don't know this stuff by 3rd year you're in trouble. You're really in trouble, because the competition for jobs is massive." As has been highlighted by research (Jones et al., 2022) many students are unable to get on-set experience unless they are in a privileged position, such as having family members already working in the sector. This quote highlights the gulf between industry and access that students have to practical experience in the sector and exemplifies the need for a game like PYWIP.

Limitations and future work

The initial study has highlighted a number of challenges and issues for future investigation in developing the game and educational resources further. The presence of international students in one seminar necessitated additional guidance due to potential language barriers, highlighting the importance of ensuring inclusivity and accessibility in educational activities. The lack of explicit instructions for gameplay may also have led to confusion or uncertainty among students, particularly those less familiar with game-based learning. Clearer guidance on gameplay could enhance the overall experience.

Despite the availability of additional resources such as interviews and crew profiles, lecturers did not effectively integrate them into the seminars and the industry professional only engaged with two or three of the video interviews and none of the educational resources. This underutilization suggests a missed opportunity to enrich the learning experience and could be addressed through better incorporation strategies. More work is required to determine why users failed to utilize these additional resources

Efforts to contextualize the game within the screen industries and research could be strengthened, particularly in emphasizing this aspect during the ERP introduction. Strengthening the connection between the game and industry needs could enhance its relevance and impact, and there are opportunities to take the game into schools or FE colleges to test with a younger cohort. The allocation of time for playing the game versus engaging with additional resources and discussions was not optimal. Balancing the pacing of activities and ensuring sufficient time for reflection and discussion could improve the overall effectiveness of the sessions. Issues also arose following the seminars, where attempts to get students to complete the PYWIP skills audit again and take part in a focus group were unsuccessful. As such, we were unable to monitor students' skills development before and after playing the game and engaging with the learning resources and were unable to assess any change in scores calculated and discussed in the context of the WLSVA (Dershem, 2020) validity measures.

Several areas of the game design have been identified for further development of the game such as: improving digital accessibility, producing similar games based on different

working environments including live events, theater or a Virtual Production studio. The critical authenticity of the game requires robust engagement with industry to ensure that the scenarios are both credible and useful.

Conclusion

A pedagogical approach to gamified simulation harnesses the cognitive benefits associated with gameplay situations. Play Your Way Into Production is designed to encourage users to probe and store simulations applicable to future real-world situations requiring familiarity, confidence, agency, and choice-making. A simulation environment promotes exploration and risk-taking that would be too costly in real life, potentially leading to loss of face, earnings, or employment opportunities. Lowering real-world stakes expands the space for reflexivity and learning.

Lecturers have played a pivotal role in situating the game and ERP within the broader screen industries context and specific research objectives. By emphasizing the purpose of testing the game's potential usefulness, students were encouraged to actively participate and provide valuable feedback. The decision not to give explicit gameplay instructions fostered autonomy and curiosity. Despite some language barriers, the overall impact on student engagement was positive, with most cohorts navigating the game with ease.

Lecturers effectively utilized the ERP by selecting and adapting modules that aligned with learning objectives and cohort needs. This tailored approach balanced relevance, engagement, and essential information while catering to diverse learning styles. ERP integration facilitated meaningful discussions on communication and assertiveness, offering practical scenarios to enhance learning outcomes.

The combination of the game and ERP effectively addressed skills gaps identified in the research. Feedback from students and industry highlighted the game's value in providing insights beyond technical roles within the screen industries. Its interactive nature encouraged students to engage deeply with scenarios and reflect on their experiences, leading to a stronger understanding of industry practices and challenges. Lecturers and industry professionals noted its unique ability to bridge theoretical knowledge and practical application.

While initial responses were positive, there are areas for improvement and further research. Underutilized resources, such as interviews and crew profiles, could be better integrated into future sessions. Incorporating additional SIGN research into the ERP or game introduction would enhance its relevance and application in industry settings. Continued data collection from students, lecturers, and industry professionals will be key to evaluating the long-term effectiveness of the game and ERP in addressing skills gaps.

Notes

1. <https://playyourwayintoproduction.com/>
2. <https://subjectguides.york.ac.uk/PYWIP-ERP/>
3. <https://screen-network.org.uk/work/skills-training/>
4. <https://onetoonedevelopment.org/>

5. An earlier version of these results were presented at the European Conference on Game Based Learning and published in the conference proceedings. This article builds on this by expanding the dataset and analysis, including data collected from industry.

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Ethics

This research project was approved by the School of Arts and Creative Technologies Ethics Committee, University of York, on 30 Jan 2024.

Data availability statement

Due to ethical approval stipulations, supporting data is not available.

References

- Allen, J. P., & de Grip, A. (2007, Invalid Date). *Skill obsolescence, lifelong learning and labor market participation*. Maastricht University, Research Centre for Education and the Labour Market (ROA). <https://doi.org/10.26481/umaror.2007006>
- Allen, K., Quinn, J., Hollingworth, S., & Rose, A. (2013). Becoming employable students and 'ideal' creative workers: Exclusion and inequality in higher education work placements. *British Journal of Sociology of Education*, 34(3), 431–452. <https://www.tandfonline.com/doi/pdf/10.1080/01425692.2012.714249>
- Anderson, L. (2006). Analytic autoethnography. *Journal of Contemporary Ethnography*, 35(4), 373–395. <https://doi.org/10.1177/0891241605280449>
- Animation, U. K. (2018). *We need to talk about skills. A skills analysis of the UK animation industry*. <https://www.animationuk.org/news/animation-uk-we-need-to-talk-about-skills/>
- Antcliff, V., Saundry, R., & Stuart, M. (2007). Networks and social capital in the UK television industry: The weakness of weak ties. *Human Relations*, 60(2), 371–393. <https://doi.org/10.1177/0018726707075880>
- BFI. (2017). *Future film skills. An action plan*. <https://www2.bfi.org.uk/sites/bfi.org.uk/files/downloads/future-film-skills-an-action-plan-2017.pdf>
- BFI. (2022). *BFI skills review 2022*. <https://www.bfi.org.uk/industry-data-insights/reports/bfi-skills-review-2022>
- BFI. (2023). *Skills scoping study for the UK's digital content production sectors*. <https://www.bfi.org.uk/industry-data-insights/reports/skills-scoping-study-digital-content-production-sectors>
- Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18(1), 32–42. <https://doi.org/10.3102/0013189X018001032>
- Carey, H., Crowley, L., Dudley, C., Sheldon, H., & Giles, L. (2017). *A skills audit of the UK film and screen industries*. The Work Foundation. https://www.screenskills.com/media/1814/420_a-skills-audit-of-the-uk-film-and-screen-industries.pdf
- Champness, ScreenSkills/Nordicity/Saffery. (2022). *Forecast of labour market shortages and training investment needs in film and high-end TV production*. <https://www.screenskills.com/media/5559/2022-06-23-labour-market-shortages-and-training-investment-needs-research.pdf>

- Chang, A., Dym, A., Venegas-Borsellino, C., Bangar, M., Kazzi, M., Lisenenkov, D., Qadir, N., Keene, A., & Eisen, L. (2017). Comparison between simulation-based training and lecture-based education in teaching situation awareness. A randomized controlled study. *Annals of the American Thoracic Society*, 14(4), 529–535. <https://doi.org/10.1513/AnnalsATS.201612-950OC>
- Chen, F. Q., Leng, F. Q., Ge, Y. F., Wang, J. F., Li, D. W. C., Chen, B., & Sun, Z. L. (2020). Effectiveness of virtual reality in nursing education: Meta-analysis. *Journal of Medical Internet Research*, 22(9), e18290. <https://doi.org/10.2196/18290>
- Connolly, T. M., Boyle, E. A., MacArthur, E., Hainey, T., & Boyle, J. M. (2012). A systematic literature review of empirical evidence on computer games and serious games. *Computers and Education*, 59(2), 661–686. <https://doi.org/10.1016/j.compedu.2012.03.004>
- Cowle, K. (1989). Training for film and television in the United Kingdom. *Educational Media International*, 26(4), 232–236. <https://doi.org/10.1080/0952398890260410>
- De Freitas, S. I. (2006). Using games and simulations for supporting learning. *Learning, Media and Technology*, 31(4), 343–358. <https://doi.org/10.1080/17439880601021967>
- Dershem, L. (2020). *WorkLinks skills & values assessment tool: Psychometric testing and validation in Algeria*. <https://www.scalingcommunityofpractice.com/wp-content/uploads/bp-attachments/7363/WLSVA-Validation-Report.pdf>
- Ebner, M., & Holzinger, A. (2007). Successful implementation of user-centered game based learning in higher education: An example from civil engineering. *Computers and Education*, 49(3), 873–890. <https://doi.org/10.1016/j.compedu.2005.11.026>
- Greitemeyer, T., & Osswald, S. (2010). Effects of prosocial video games on prosocial behavior. *Journal of Personality and Social Psychology*, 98(2), 211–221. <https://doi.org/10.1037/a0016997>
- Grugulis, I., & Vincent, S. (2009). Whose skill is it anyway? ‘soft’ skills and polarization. *Work, Employment and Society*, 23(4), 597–615. <https://doi.org/10.1177/0950017009344862>
- Hewett, K. J., Zeng, G., & Pletcher, B. C. (2020). The acquisition of 21st-century skills through video games: Minecraft design process models and their web of class roles. *Simulation & Gaming*, 51(3), 336–364. <https://doi.org/10.1177/1046878120904976>
- Hughes, E., & Webber, D. (2023). Attracting & Sustaining the Screen Industry Workforce in Yorkshire and the Humber. <https://screen-network.org.uk/publication/attractingsustaining-the-screen-industry-workforce-in-yorkshire-and-the-humber/>
- Iacovides, I., Cutting, J., Beeston, J., Cecchinato, M. E., Mekler, E. D., & Cairns, P. (2022). Close but not too close: Distance and relevance in designing games for reflection. In *Proc. ACM hum.-comput. Interact* (Vol. 6). CHI PLAY. <https://doi.org/10.1145/3549487>
- Jones, B., Swords, J., & Brereton, J. (2022). *Skills and training provision in the UK film and TV industries*. SIGN. <https://screen-network.org.uk/wp-content/uploads/2022/11/ST-report-final.pdf>. Forthcoming.
- Maharg, P. (2004). Virtual firms: Transactional learning on the web. *Journal of the Law Society of Scotland*, 49(10). <https://core.ac.uk/download/pdf/156625662.pdf>
- McGuinness, S., Pouliakas, K., & Redmond, P. (2017). *How useful is the concept of skills mismatch?* ILO. https://www.ilo.org/skills/pubs/WCMS_552798/lang-en/index.htm
- Méndez, M. (2013). Autoethnography as a research method: Advantages, limitations and criticisms. *Colombia Applied Linguistics Journal*, 15(2), 279–287. http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0123-46412013000200010&lng=en&tlng=en
- Mukerji, C. (1977). Film games. *Symbolic Interaction*, 1(1), 20–31. <https://doi.org/10.1525/si.1977.1.1.20>
- O’Carroll, L. (2023, January 17). *Shortfall of 330, 000 workers in UK due to Brexit, say thinktanks*. *The Guardian*. <https://www.theguardian.com/politics/2023/jan/17/shortfall-of-330000-workers-in-uk-due-to-brexit-say-thinktanks>
- Ozimek, A. M. (2021). Skills shortages, gaps and training needs in the screen industries in Yorkshire and the Humber: Scoping report. SIGN. <https://screen-network.org.uk/publication/skills-shortages-gaps-and-training-needs-in-the-screen-industries-in-yorkshire-and-the-humber/>
- Payne, M. T. (2011). Everything I need to know about filmmaking I learned from playing video games: The educational promise of machinima. In H. Lowood & M. Nitsche (Eds.), *The machinima reader* (online ed.). MIT Press Scholarship Online. 22 August. 2013. <https://doi.org/10.7551/mitpress/9780262015332.003.0015>

- Peacock, A. (1986). *Report of the committee on the financing of the BBC*. HMSO.
- Petrie, D. (2012). Creative industries and skills: Film education and training in the era of new labour. *Journal of British Cinema and Television*, 9(3), 357–376. <https://doi.org/10.3366/jbctv.2012.0095>
- PixelCraze. (2024). Movies tycoon. *Steam*. https://store.steampowered.com/app/2659050/Movies_Tycoon/
- Proudfoot, K. (2023). Inductive/deductive hybrid thematic analysis in mixed methods research. *Journal of Mixed Methods Research*, 17(3), 308–326. <https://doi.org/10.1177/15586898221126816>
- Raising Films. (2021) HOW WE WORK NOW SUMMARY. Learning from the Impact of COVID-19 to Build an Industry that Works for Parents and Carers. *Raising Films*. <https://www.raisingfilms.com/wp-content/uploads/2021/10/Raising-Films-How-We-Work-Now-2021-Executive-Summary.pdf>
- ScreenSkills. (2019). *ScreenSkills assessment: August 2019*. <https://www.screenskills.com/media/2853/2019-08-16-annual-screenskills-assessment.pdf>
- ScreenSkills. (2021). *ScreenSkills assessment 2021*. <https://www.screenskills.com/media/4587/2021-06-08-screenskills-assessment-2021.pdf>
- Shorey, S., & Ng, E. D. (2021). The use of virtual reality simulation among nursing students and registered nurses: A systematic review. *Procedia - Social and Behavioral Sciences Elsevier BV*, 98, 104662. <https://doi.org/10.1016/j.nedt.2020.104662>
- Short, D. (2012). Teaching scientific concepts using a virtual world - minecraft. *Teaching Science*, 58(3), 55–58.
- Skillset, Creative. (2014). *Employer panel film report*. https://www.screenskills.com/media/1557/employer_panel_film_report_march_2014.pdf
- Skillset/UK Film Council. (2003). *A bigger future: The UK film skills strategy*. <https://www2.bfi.org.uk/sites/bfi.org.uk/files/downloads/uk-film-council-bigger-future-report.pdf>
- Software, Starbyte. (1995). *Hollywood pictures*. Starbyte Software.
- Studios, Lionhead. (2005). *The movies*. Activision.
- Van Loo, J., De Grip, A., & De Steur, M. (2001). Skills obsolescence: Causes and cures. *International Journal of Manpower*, 22(1/2), 121–138. <https://doi.org/10.1108/01437720110386430>
- Wang, D. Y., & Chen, Y. A. (2012). Training teamwork skills using MMORPGs. *Proceedings of the 2012 IEEE Fourth International Conference On Digital Game And Intelligent Toy Enhanced Learning* (pp. 94–98). <https://doi.org/10.1109/DIGITEL.2012.24>
- Willment, N., Jones, B., Swords, J., & Brereton, J. (2024). The importance of professional skills within the changing media landscape of the UK screen industries: A case study of the ‘disruptive’ phenomenon of virtual production. *Media Practice & Education*, 26(1), 1–19. <https://doi.org/10.1080/25741136.2024.2336759>
- Willment, N., & Swords, J. (2023). *What is virtual production? An explainer and research agenda*. XR Stories. https://eprints.whiterose.ac.uk/206110/1/What_is_VP_final2_1_.pdf
- Zborowski, J., Mayne, L., & Macrae, S. (2024) *Bridging the expectation gap?: Evaluating the work-readiness of pre-university media students in Yorkshire and the Humber*. SIGN. https://eprints.whiterose.ac.uk/id/eprint/215099/1/Bridging_the_expectation_gap_final.pdf
- Zechner, J., & Ebner, M. (2011, September 21–23). Playing a game in civil engineering the internal force master for structural analysis. *Proceedings of The 14th International Conference on Interactive Collaborative Learning* (pp. 417–422). <https://doi.org/10.1109/ICL.2011.6059618>