This chapter explores the challenges faced by educators in incorporating immersive, virtual reality (VR) contents into screen media education. It suggests several ‘threshold concepts’, or critical conceptual gateways, relevant to immersive media and cinematic virtual reality (CVR) concerning narrative emphasis, spatiality and structure. It shares an experimental visual and conceptual methodology that integrates these concepts and can be applied in the earliest stages of planning and conceptualising immersive VR media, with the potential for application or adaptation by other screen education practitioners. This approach has been trialled within the classroom in the context of the undergraduate subject Online Documentary at the University of Technology Sydney (UTS) (2017 and 2018), allowing students to apply the key concepts to existing projects and to implement the framework for the conceptualisation of future projects.
VR and Screen Education: An Approach to Assist Student Understanding of Narrative Emphasis, Spatiality and Structural Elements within Narrative VR

Megan Heyward

INTRODUCTION

Following the emergence and uptake of immersive imaging technologies and delivery formats such as 360-degree video and virtual reality (VR), screen practitioners are engaging with the potentials and challenges of developing content for new formats, while adapting and translating their existing production skills across to new modes. Given this renewed interest in emergent 360-degree and VR works, encompassing cinematic virtual reality (CVR) as well as interactive modes, screen educators are increasingly required to engage with the potentials of these new formats within a screen media education context, to facilitate student learning as well as prepare students for a diverse and complex professional landscape.

As we seek to support student learning, we face multiple challenges arising from the disruption of traditional moving-image storytelling by a frameless, immersive 360-degree format, including challenges with the shooting process, technical aspects of editing and post-production, and complexities encountered if the immersive content is also interactive, offering a set of options to the audience as they negotiate the environment. Before engaging with production issues, we encounter obstacles concerning conceptualisation, scriptwriting and storyboarding approaches for these formats, since there is currently no standardised approach for CVR or 360-degree scripting. As educators engaging
with the reality of immersive media, our task is complex and our toolkit has
some gaps.

This chapter explores challenges faced by educators in incorporating immersive VR content into screen media education, and suggests several ‘threshold concepts’ (Land and Meyer 2003) or critical conceptual gateways relevant to immersive media and CVR concerning narrative emphasis, spatiality and structure. It shares an experimental visual and conceptual methodology that integrates these concepts and can be applied in the earliest stages of planning and conceptualising immersive VR media, with the potential for application or adaptation by other screen education practitioners. This approach has been trialled within the classroom in the context of the subject Online Documentary at the University of Technology Sydney (UTS) in 2017 and 2018, allowing students to apply the key concepts to existing projects and to implement the framework for the conceptualisation of future projects.

**Active Learning in New, Strange Places within Screen Education**

A transition towards student-focused, constructivist learning strategies and away from teacher-focused approaches has been encouraged in higher education since the mid-2000s. Constructivist learning emphasises student-centred active learning with the teacher as facilitator (Stewart 2012), alongside a reframing of the teacher role from experts to ‘meddlers in the middle ... actively sharing with students in their learning’ (Hunt 2013 discussing McWilliam 2007, p. 40). McWilliam’s insightful suggestions for ‘unlearning’ traditional approaches to university teaching include:

1. Less time giving instructions and more time spent being a usefully ignorant co-worker in the thick of the action;
2. Less time spent being a custodial risk minimiser and more time spent being an experimenter and risktaker;
3. Less time spent being a forensic classroom auditor and more time spent being a designer, editor and assembler;
4. Less time spent being a counsellor and ‘best buddy’ and more time spent being a collaborative critic and authentic evaluator. (McWilliam 2008, p. 263)

These suggestions are especially relevant to creative disciplines where experimentation, collaboration, iteration and feedback are important aspects of the creative development process. Hunt (2013) notes the emphasis on authentic, challenging learning tasks as an important feature of active learning, citing Barnett’s description of the process as potentially unsettling for students, since they are ‘required to venture into new places, strange places, anxiety-provoking places’ (Barnett 2007, p. 147).

The notion of strange, new and anxiety-producing places is also likely to be familiar to teachers developing learning materials for emerging screen practices such as immersive VR media. Here teachers, as much as students, grapple with
rapid technological change, evolving software and toolkits and the uncertain translation of their existing skills into new formats. These challenges reinforce McWilliam’s guidance to teachers towards experimentation and risk-taking, and to acting as more of a ‘usefully ignorant co-worker’ than an expert.

Threshold Concepts in the Disciplines

Concurrent to the shift in teaching and learning towards a learner-focused practice, integrating active learning and authentic, challenging tasks and activities (Angelo 2012) has been recognition of the role of ‘threshold concepts’ (Meyer and Land 2003) operating as a conceptual framework at the level of disciplines. Threshold concepts are critical, transformative conceptual gateways that, when understood, lead to deep learning through the internalisation and integration of the concepts. Meyer and Land express it as follows:

A threshold concept can be considered as akin to a portal, opening up a new and previously inaccessible way of thinking about something. It represents a transformed way of understanding, or interpreting, or viewing something without which the learner cannot progress. As a consequence of comprehending a threshold concept there may thus be a transformed internal view of subject matter, subject landscape, or even worldview. (Meyer and Land 2003, p. 1)

The theory of threshold concepts has been explored across many disciplinary contexts, including economics, languages, engineering, biology, teacher education and product design (Land et al. 2008). Hunt (2013) discusses threshold concepts in the discipline of sociology, paired with active learning strategies of discovery, exploration, experimentation, reflective practice and the scaffolding of learning by the teacher. The threshold concepts framework has recently been applied to the discipline of writing studies (Adler-Kassner and Wardle 2015) where multiple teachers and researchers collaborated via wiki, identifying 37 threshold concepts relating to writing, and sharing approaches for integrating the concepts within learning and teaching activities.

It is not clear whether the threshold concepts framework has been formally applied to the area of screen production, yet it is likely that such a framework could be applied and a set of concepts identified, indeed they are likely to represent many of the key areas of screen grammar that we regularly examine and incorporate in our curricula. A basic list might include familiar concepts such as the shot, framing and composition; editing and shot relationships; point of view (POV) and subjectivity; conflict as a narrative drive within drama; and spatial continuity within the 180-degree frame.

It is not my intention to attempt to define threshold concepts in relation to screen production, and this by no means represents an exhaustive list. Their relevance lies in their transformative and integrative qualities, such as the deep learning (Angelo 2012) students experience when they undertake certain activities like an editing or continuity exercise or project-based assessment, where
processes of experimentation, exploration, collaboration and feedback work to
embed the concepts. They may also demonstrate themselves as transformative
threshold concepts though their experience of troublesome knowledge (Land
et al. 2003), since the deep learning of the concepts may be more fully inte-
grated following inadequate realisation within a student exercise or project,
such as a scene that is disruptive due to crossing the line, or an edit that conf-
fuses an audience about character motivation due to a lack of reaction shots.

I will turn my attention now to immersive, 360-degree VR to consider pos-
sible threshold concepts applicable to this emergent area, and how these might
be explored in the context of screen education. I wish to emphasise that this is
not presented as a definitive list but rather a starting point for further discus-
sion and debate.

ON VR, 360-DEGREE VIDEO, NARRATIVE VR AND CVR

VR re-entered public consciousness in 2012 following the launch of Palmer
Luckey’s Kickstarter campaign for the Oculus Rift VR platform, which raised
an impressive US$2.4 million in its first three months. Although the Rift was
envisioned as a highly immersive interactive gaming platform, and in 2012 the
headset was only a prototype, it generated huge industry and consumer interest
and effectively initiated the re-emergence of the VR media sector, which had
been slowly operating in the technology background after a series of technical
setbacks in the mid-1990s. When Facebook purchased Oculus in early 2014
for US$2 billion, ‘virtual reality blew up’ (Robertson and Zelenko 2014, p. 2)
with the purchase triggering an unprecedented round of commercial invest-
ment in VR media and technologies.

The surge of research and development into VR converged across game,
film and technology sectors, evident in the rapid expansion of imaging and
camera technologies, programming, animation and editing software, and end-
delivery devices for VR and 360-degree content. The commercial release of
affordable 360-degree consumer cameras (GoPro, Ricoh) and viewing plat-
forms (Google Cardboard) from late 2014 motivated media practitioners as
well as mainstream audiences. VR became increasingly investigated as a creative
filmic medium, often in the context of 360-degree documentaries but also in
the form of dramatised storytelling, posing challenges for screen educators in
terms of student learning regarding this rapidly materialising form.

The term ‘cinematic virtual reality’ or CVR has emerged to describe live
action 360-degree VR projects that draw primarily on ‘lens-based cinemato-
graphic moving image practice’ (Ross and Munt 2018, p. 192) and are deliv-
ered as an immersive VR experience. CVR incorporates the kind of high-end,
high-fidelity image and sound quality associated with broadcast and cinematic
media; however, interactivity and audience agency—the potential to interact
with or alter the unfolding of narrative sequences—is normally limited to
exploring which portion of the 360-degree screen to view at any time (Mateer
2017). Under this definition, documentary projects such as Clouds over Sidra
(2016), *Notes on Blindness* (2016) and *Collisions* (2017) are considered CVR, along with more conventionally dramatic works such as Doug Liman’s *Invisible* (2017). It should be noted that the CVR definition may perhaps be more uncertain in relation to projects that include interactivity, such as *VR Noir* (2017), which incorporates the high production values of CVR but is also dependent on interactive choices made by the audience in order for the narrative to play out. *Cardboard Crash* (2017) also opens up questions about CVR as a term considering it is an animated VR work involving the viewer choosing between various interactive options and ethical outcomes as they travel in a driverless car.

Whether ‘cinematic virtual reality’ is also the appropriate term for more factually oriented journalistic or documentary approaches to live action 360-degree video is also somewhat unclear. Examples of these include the *Guardian*’s project on the impacts of solitary confinement, *6×9* (2016), VICE TV’s *Cut Off VR* (2017), documenting Justin Trudeau’s visit to a remote Canadian First Nation land, or *Autism TMI* (2017), which conveys the experience of an everyday shopping trip through the eyes of autistic child. This uncertainty reminds us how recent this wider engagement with VR really is, and highlights the challenges for educators as well as the necessity to remain open to diverse ways of discussing and understanding the form as it matures.

Kath Dooley uses the term ‘narrative virtual reality’ somewhat interchangeably with CVR to describe live action 360-degree VR projects which may incorporate greater or lesser degrees of audience agency and interactivity, representing a ‘medium-specific, user-focused, engagement with time and place’ where ‘stories often play out in real time ... the VR viewer is “present” as an active agent who is involved in the unfolding narrative’ (Dooley 2017, p. 161). She defines narrative VR projects as ‘story-based drama, documentary or hybrid productions that feature a beginning, middle and end, although not necessarily in that order’ (p. 162) and emphasises a spectrum of possible audience agency, from choosing a viewing direction within 360-degree films to more game-like experiences involving choices and interactive options. Dooley discusses the importance of a ‘core experience’ or core narrative to frame and orient the audience experience within narrative VR, and draws attention to a possible optimal sweet spot integrating a core narrative with a certain degree of audience agency. Considering Dooley’s slightly broader, inclusive definition, I will alternate somewhat between the terms narrative VR and CVR across the next sections.

**Narrative Emphasis and ‘Key Moments’ as Threshold Concepts in Narrative VR**

As educators, we understand that familiar shooting and editing practices for directing audience attention within traditional film do not operate as effectively within the immersive narrative VR experience. Irrespective of the degree of
interactivity, issues regarding how to manage and direct audience attention within a 360-degree scene are significant in narrative VR, in ways distinct from traditional film. For example, more time is needed for the audience to orient themselves within a narrative VR scene (Dooley citing Grambart 2015). Attracting and directing the viewer’s attention is also an essential consideration (Dooley 2017) due to the potential for the audience to miss critical aspects of narrative if they happen to be looking in the wrong direction when something important happens.

Artist and filmmaker Lynette Wallworth, who developed the Emmy Award-winning narrative VR documentary *Collisions* (2016) and more recently, the acclaimed VR project *Awavena* (2018) worked with immersive media for two decades, often in an installation context, before exploring the narrative and immersive potentials of VR. Her understanding of how to conceptualise and shape immersive experiences across multiple formats and environments is significant. Regarding *Collisions*, Wallworth discussed the use of sound to frame the experience, and about ‘trigger points’ or ‘key moments’ in the story that can be signposted by sound cues, allowing the viewer to turn in that direction to experience important elements taking place within a portion of the 360-degree field.

Sound is so important in VR. It’s so important because it (be)comes a tour to guide and direct the viewer ... You’re calling attention continually, and because you have the capacity then to see 360 then you use sound to frame the viewers’ experience ... There are trigger points or key moments that then make you look up if the action is above you, or if you need someone to look behind ... because they can look anywhere in that space so, that sound is incredibly effective because you get that sense of where the sound was located. (Wallworth 2016, video interview)

The use of sound as a means of directing audience attention is also employed by other VR and film practitioners, but I understand Wallworth’s meaning here as emphasising the concept of narrative ‘key moments’ occurring within 360-degree space. If we understand narrative VR as a form in which the viewer is located centrally, where stories often play out in real time and where the viewer can direct their attention to different parts of the 360-degree scene, understanding where (in space) and when (in time) important moments of narrative emphasis occur—key moments—is critical to our conceptualisation and planning of VR content. This also resonates with the notion of the CVR core experience (Dooley 2017) but identifies points of heightened narrative emphasis more clearly within a scene.

If we consider ‘key moments’ as a narrative concept rather than purely sound-focused concept, we can begin to more readily consider questions such as: what are the ‘key moments’ within this scene; when do they occur in the scene, where do they occur in the scene, how do we draw attention to them, how many are in a particular scene, is the pacing between key moments appropriate
in the VR context, for example are there too many or too few in the scene, or
do they require too much rapid turning or spinning to be comfortable for the
person experiencing the work. If, as educators, we consider ‘key moments’ as
an important threshold concept for understanding narrative emphasis in narra-
tive VR, then we can use it to help students identify and map where key
moments of narrative emphasis fall within a VR scene. The concept of ‘key
moments’ considers both the spatial and time-based factors relating to narra-
tive emphasis within VR, and offers an approach that can markedly assist in
mapping and directing audience attention, and in conceptualising and plan-
ning narrative VR experiences.

**Spatial Relationships and ‘Spatiality’ in the 360-Degree Field**

From a spatial perspective, classical filmmaking involves a series of distinct shots
edited together to convey narrative, present POV and direct audience atten-
tion, drawing from a suite of shots, angles and editing conventions and operat-
ing predominantly within a 180-degree field of vision. In this field, actors are
in front of the camera, on one side of the 180-degree line, crew are behind the
camera on the other side of the line, and cinematic action occurs generally
within the 180-degree space. Classical continuity editing is predicated on these
spatial relationships, and represents a familiar, essential conceptual understand-
ing in screen production education.

VR is a more or less frameless form where the audience is positioned inside
a 360-degree space, with no edge of screen or frame boundary apart from the
edge of the headset itself. This leads to production challenges in terms of the
visibility of equipment and crew, issues in directing audience attention within
360-degree space and the challenges in translating traditional filmic representa-
tions such as scriptwriting and storyboarding into the 360-degree environ-
ment. Physical reactions and processes involving proprioception are also
activated by immersion in a wraparound visual field (Dooley 2017). As such,
attention to defining spatial relationships within a 360-degree scene is para-
mount, in terms of storytelling and production as well as audience experience.

Vincent McCurley, Creative Technologist at the National Film Board of
Canada and developer of Cardboard Crash, has written about the specific spa-
tiality of VR and the need to place the audience at the centre of the VR scene:
‘For VR ... instead of objects being defined relative to the frame, we define
them relative to the audience. This approach should come naturally to practi-
tioners of user-centered design, but may feel foreign to those used to directing
audience attention’ (McCurley 2016, p. 1).

Multiple experimental approaches to scripting and storyboarding CVR proj-
ects are currently being investigated as screen practitioners and scriptwriters
explore how to write for this form. These include various modifications of the
traditional master scene scriptwriting template to incorporate spatial elements,
often by dividing the scene into four quadrants—front, back, left and right—comprising four zones of potential action that need to be taken into account within each scene (Ross and Munt 2018). However, there are drawbacks to applying traditional text-focused approaches to a form in which spatiality is so critical. This has led to further experimental adaptations of the text-based script, such as colour coding of different quadrants (Petridis 2017) or including diagrams, shot descriptions and even timings of key actions into ‘a hybrid document, which is part-script, part-storyboard and part-shot list’ (Ross and Munt 2018, p. 202). Ross’ own hybrid scripting approach integrates a scene description, a separate audio description, a 360-degree diagram and a still image representing the style of the visual evident within the scene. This diversity heightens the complexity for screen educators seeking to engage with VR content in the classroom.

In terms of 360-degree storyboarding, there is a similar recognition of the criticality of spatial relationships, although variations exist in the specifics. VR practitioners Vincent McCurley and Andrew Leitch have modified traditional film storyboards to depict CVR space. McCurley uses an elliptical frame that depicts onscreen elements and their spatial relationships essentially from the top down, and represents the audience or viewer as an element at the centre of the visual (McCurley 2018). Leitch also uses a top-down elliptical depiction of spatial relationships with the audience again positioned centrally, alongside a curved frame showing front and rear visuals from a front-on audience perspective, that is, in the manner of a traditional storyboard (Leitch 2017).

At conceptualisation, scripting, storyboarding and production stages, as well as the experiential stage where the audience actually engages with an immersive CVR work, spatial relationships are an essential element for VR producers to understand, define and manage. From this we can recognise that spatiality and spatial relationships within the 360-degree field are a pivotal threshold concept within CVR, and that educators must develop ways to assist students to understand and effectively define spatiality within VR.

‘Structure’ within the Narrative VR Experience

CVR emerged from a context of computer games, a form in which audience agency and interactive engagement is understood as a fundamental aspect of the experience. Computer games themselves represent a prominent category within the extensive range of interactive media and digital platforms that have emerged since the 1980s, across computing, software, networked communication, and the suite of apps, devices and platforms we negotiate in our everyday lives. Designing content and interactivity for these digital platforms involves finding ways to manage the flow of content and the types of interactivity available, and developing approaches that emphasise intuitive, easily comprehensible user experience within potentially complex systems.

Jesse James Garrett was the first to propose a diagrammatic model identifying the various elements that worked together to create the overall user experi-
ence for software and websites. These ‘elements of user experience’ (Garrett 2002) identified strategic, functional, structural, navigational, interactive and visual elements operating together to construct the shape and user experience of the interactive media and products with which we engage. Over time, the strategy component of Garrett’s elements shifted to a predominantly user-centred perspective (Garrett 2003; Kuniavsky 2010; Norman 2013), leading to the emergence of what is now termed ‘user-centred design’ or UCD, evident in the design of products as diverse as the iPod, interactive toys and banking services (Kuniavsky 2010). However, the identification of interrelated factors shaping user experience continues to be recognised as a fundamental principle of UCD.

Garrett defined ‘structure’ as interrelated elements combining the types of interactivity available—the interaction design—and the flow of content within the system—the information architecture or ‘arrangement of content elements within the information space’ (Garrett 2003, p. 32). He streamlined a complex set of interlinked elements into a simple diagrammatic model, providing a methodology for designing interactive media that foregrounded user experience and provided clarity and flexibility at the planning and conceptualisation stage.

Garrett’s use of minimal box and line ‘wireframe’ diagrams to convey overall content flow or information architecture, paired with more atomised wireframes depicting screens with navigation details and interactive buttons, has become a standard methodology in user experience and user interface (UX/UI) design for website, software, game and mobile applications. Wireframing is now an integral aspect of the iterative, agile developmental process for digital content, providing a methodology that combines conceptual flexibility, rapid iteration and prototyping, and the potential for user testing and feedback prior to building an expensive final version of a project that may otherwise turn out to be difficult to use or provide an unsatisfying user experience. User experience, the types of interactivity available to the viewer and the flow of content within a work are also important considerations in designing VR.

VR media span a range of possible forms of interactivity, from the high agency and interaction involved in VR gaming, through to the lesser interactivity within CVR. Although CVR may involve lesser degrees of interactivity than a game, it is nevertheless a real-time engagement with time and place (Dooley 2017), involving a viewer navigating an environment and making choices about where to look or what to do or see next, whether experienced within a single scene, unfolding over multiple sequential scenes, or by the viewer making choices so that certain scenes instead of others are seen within an interactive CVR.

The majority of narrative VR projects can be seen to operate with a single scene or sequential scene structure. Common examples include 6×9 (single), Clouds over Sidra (sequential), Notes on Blindness (sequential), Collisions (sequential), Autism TMI (essentially a single scene). A scene normally conveys a core narrative (Dooley 2017) along with key moments and trigger points of
narrative emphasis within each scene (Wallworth 2019). CVR projects structured sequentially often utilise a fade to black or white as a transition between scenes, assisting audience acclimation and orientation. Single scenes of several minutes in length, or a series of sequential scenes, often of a similar length, are the most recognisable structure for CVR, accounting for the short overall length of most experiences, which mainly fall under 15 minutes.

Interactive structure is also evident in selected narrative CVR works such as VR Noir and Cardboard Crash, in which users use a hand controller, tap buttons on the side of the VR headset, or use eye gaze to focus on certain onscreen points of interest (POIs) in order to choose between interactive options. In terms of overall project length, interactive CVR projects tend to offer a limited set of options so as to limit the overall length of the CVR experience, which otherwise could negatively impact audience comfort. In the same way, rapid editing within narrative VR projects is generally discouraged due to concerns around audience comfort, proprioception and the resulting user experience.

Identifying the structure of a CVR work, whether single scene, sequential scene or interactive structure, helps us to understand the flow of content within a CVR experience, the types of interactivity involved, the areas of narrative emphasis and the overall shape and complexity of the VR experience. It helps us to understand what the audience is experiencing, when they are experiencing it, what they are being asked to do and how long they are there. From an educational perspective, a structural understanding of narrative CVR, represented via a simple wireframe, can allow students to more easily understand narrative flow and the specifics of the user experience. Structural wireframing can therefore act as a tool to assist in identifying potentially problematic areas and rapidly make adjustments, providing clarity and iterative flexibility at the conceptualisation stage prior to the complex shooting and editing stages of CVR production.

**In the Classroom: An Active Learning Approach**

**Integrating Key Moments, Spatiality and Structure via a Wireframe Visualisation**

If we recognise key moments of narrative emphasis, spatial relationships within the 360-degree field and the overall structure of the VR experience as important threshold concepts contributing to the experience of narrative VR, then we can consider how these concepts might be effectively explored and applied in the classroom. This section discusses an experimental visual methodology integrating these concepts into a simple wireframe visualisation that can be applied to existing narrative VR works, or implemented to rapidly conceptualise and plan new projects. It has been successfully trialled within an undergraduate subject, Online Documentary, at UTS from spring 2017 onwards.

Online Documentary explores the creative, distributive and iterative potentials arising from the intersections of digital technologies with documentary
form. Taught within the Bachelor of Communication, its focus has been primarily on emerging opportunities for developing interactive, online content in documentary and factual genres using digital media platforms. Following the re-emergence of VR since 2014 and the resulting development of multiple immersive documentary and factual projects across 360-degree video and CVR, it has been important to include VR as a relevant form to be examined within the subject.

The students are drawn from majors across the communication degree including screen media (media arts and production), journalism, writing, digital and social media, as well as other majors. Approximately one-quarter are screen media students with a reasonable understanding of screen fundamentals such as shooting, editing, continuity and storyboarding. The tutorials run in Mac labs due to the emphasis in early classes on examining online documentaries, and later, on developing online documentary project prototypes in small teams. A lecture programme frames the weekly content to be explored in the tutorials through contextualising important concepts, unpacking planning and developmental approaches and considering future documentary directions.

During the VR-focused week, the lecture discusses the increasing use of VR and immersive media for documentary contents before considering the concepts concerning key moments, spatiality in the 360-degree field and VR project structure, whether single, sequential or interactive. These concepts are also presented as a visual and conceptual wireframe, offering a framework for planning and conceptualising VR projects rapidly and intuitively. The approach draws together a basic 360-degree spatial visualisation, depicted from the top down within a circular frame with rough spatial depictions of key POIs within the scene, a timeline of key moments of narrative emphasis and a basic structural wireframe concerning the number and sequencing of VR scenes. The example diagram (Fig. 1) is hand-drawn and deliberately rough to emphasise the iterative nature of project wireframing. Students are shown a short VR project that can be displayed via a 360-degree web browser, such as Autism TMI, a two-minute work developed by the UK's National Autistic Society, followed by a corresponding visual wireframe integrating the concepts of spatiality, key moments and structure.

*Autism TMI* operates extremely well in this instance, involving a clear POV and narrative (an autistic person experiencing sensory overload in a shopping centre) that unfolds with increasing intensity over time, marked by key moments and distinct spatial relationships (a woman with loud clacking shoes, man with vibrantly coloured balloons, the bright flashing lights of a shop, a cleaner pushing a mop entering and leaving the 360-degree field). This sensory intensity leads to tunnel vision and the scene darkens, until vision returns and the person is found to now be outside the centre and calm. Elements within the soundtrack and visuals reinforce the key moments within the work, such as high saturation colour on the balloons and bucket, heightened audio of clacking heels, fast breathing and the mother’s voice fading or returning. Spatial relationships, key
moments and structure within the project are clearly demonstrable and evident via the wireframe diagram.

In the tutorials, students are provided with two active learning tasks to assist in embedding the concepts. The first is a reverse engineering exercise in which students working in small teams examine two existing narrative VR projects, such as *Clouds over Sidra*, *6 × 9*, *The Source*, *Cut Off VR* or similar works that can be explored via 360-degree web browser on desktop machines or laptops. They are asked to identify the key moments, spatial relationships and the project structure, and create a hand-drawn wireframe of these in the style of the example visualisation, including the 360-degree frame and the spatial relationships within it, a timeline and the overall project structure. For simplicity and ease of access most of the in-class examples are either single-scene or sequentially structured VR works. Tutors move around the room to view the student
diagrams, understanding that while there may be some variations between teams, the visual wireframing methodology has been understood and effectively applied to the example works.

The second exercise further embeds this method by asking students to brainstorm and devise a short VR experience concerning a documentary or factual issue. Normally a topic is presented, which may revisit topics or exercises students have engaged with earlier in the semester. One example allows students ten minutes to brainstorm an immersive VR experience aimed at 13 to 17-year-olds, to act as an anti-drug, anti-ice experience. Students must define POV within the concept, identify whether it is a single scene, sequential or interactive structure, map out spatial relationships within scenes, and identify key moments of narrative emphasis. They are then provided a further ten minutes to draw up the concept using a wireframe visualisation, and then present the concept back to the class.

Using this methodology, students have rapidly conceptualised and visualised a range of intriguing and diverse VR experiences, such as a single scene involving waking up on a hospital gurney with doctors and nurses attending to you, an overdose victim, sequential scenes charting a fall into addiction across multiple locations (e.g. party, bedroom, dilapidated home), or a single scene charting a drug deal gone wrong, with the potential for further engagement with objects in the scene (see Fig. 2). What is most striking about using this method in the classroom is observing how quickly students are able to conceptualise and plan the overall shape of a VR experience while simultaneously understanding the various elements and relationships within the experience.

This approach provides a methodology that rapidly facilitates student understanding of elements critical to narrative VR. It also provides a tool allowing fast, flexible conceptualisation and iteration of VR content that can be applied well before more detailed scripting, storyboarding and production stages. Implementing this approach at the earliest stages has the potential to engage students promptly and intuitively with a VR experience, assess the overall shape and emphasis and make refinements if required, well before they become attached to their ideas, commence detailed scripting or become resistant to revisions. The flexible nature of the visualisation supports iterative brainstorming and helps to identify potential problems before they become realised in production form.

**Conclusion**

The visual wireframe methodology presented represents a flexible, iterative approach that can be applied to rapidly conceptualise the overall shape and scope of narrative VR works, map spatial relationships, identify key moments of narrative emphasis and understand the structural flow, pacing and complexity of scenes available to the audience within the VR experience. It has proven to be an intuitive and highly usable tool within the screen media classroom, both
for embedding critical threshold concepts concerning narrative VR and for conceptualising future work.

We cannot predict the future of narrative-driven CVR and immersive media or the shapes it might take: whether explorations of spectacular environments, character-based interactions within an unfolding drama, immersive virtual experiences shared in real time or other forms yet to be determined. Just as screen practitioners are experimenting with the potentials of narrative VR, screen educators must also consider alternate methods to facilitate student understanding of this emergent form. As Dooley (2017) suggests, there is no singular approach or even established screen grammar for narrative VR, and perhaps no singular approach is appropriate; rather we need to engage a broader, more fluid set of tools, supporting adaptive, flexible approaches to media development and the capacity for rapid iteration and refinement prior to the production phase. As such, this visual wireframing approach, operating along with other CVR scripting and storyboarding approaches in development.

Fig. 2 Student VR wireframe diagram from in-class exercise by Elizabeth Dominis and Eloisa Justa, 2018
or still to emerge, may prove increasingly effective within an expanded narrative VR toolkit, and highly relevant to screen media educators as well as students.

REFERENCES


## Author Queries

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