

# A Breadth-First Introduction to VFX: A Holistic Approach for Teaching the Visual Effects Production Pipeline

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**Figure 1:** A student submission of the “Introduction to Production Tools” CG drinks can assignment, showing a computer generated drinks can composited into a live action photographed background (only the drinks can is CG, everything else is real).

## Abstract

*This paper outlines a tried and tested breadth-first approach for teaching essential key areas of the visual effects post production pipeline to novices. Successfully used in a first semester course our holistic process guides the creation of a single self-contained visual effects shot (video sequence) of photorealistic quality. We provide an overview of course curriculum, organization and exercises (lessons covering the essential areas of visual effects production for creating each of the individual elements of the final shot, as well as the final shot construction and composition itself), outline the assessment and discuss the evolution of the course, which we consider a model of “best practice” for teaching the 3D artists’ introductory computer graphics sequence.*

## 1. Introduction

In recent years the sheer amount of information available for those wanting to learn about computer graphics, 3D modelling, animation, the visual effects (VFX) production pipeline and related processes has increased a great deal. From online resources in the form

of free video tutorials via websites like YouTube and Vimeo, to full degree programmes in visual effects production, the volume of material available is immense, but also widely varied in terms of quality, relevance, and currency with regards to the latest developments in software technology. There are many educational institu-

tions across the world that are now offering bespoke degrees and training courses specifically dealing with the production of VFX for the purpose of educating those who aspire to gain employment in the feature film industry and other related areas such as television and commercials [Hil15].

In terms of single courses, sets of courses or whole degree programmes, the vast majority of educational literature for this domain is concerned with the more mathematical/technical and computer science aspects of computer graphics, computer animation and visual effects. Proportionately very little consideration is given to the teaching of art, design and production aspects of computer animation and visual effects. This is somewhat surprising as in the UK alone, the university application body UCAS (Universities and Colleges Admissions Service – <https://www.ucas.com>) lists about 70 undergraduate degree programmes under the search term “Visual Effects”, some of which are just called “Visual Effects”, and some of which have the term “Visual Effects” as part of the programme name such as “3D Animation and Visual Effects”. This is beside the many different additional programmes that contain courses or course options that would be relevant to a career in the VFX industry but that do not explicitly employ the bespoke title of “visual effects” but that are usually more general in nature and frequently grouped under titles like “Animation”, “Film Studies”, or “Media Production”.

There clearly is demand for appropriate recognized educational qualifications for this domain [LH11], that provide learners with the necessary grounding in the key basic principles of all areas of the production pipeline [Dun14, Chu11] and that exposes them to relevant software tools and techniques used by industry practitioners in a professional environment. We share the view that students need to be able to look beyond the tools used [EME02] and that for the post production visual effects pipeline to be taught effectively it is essential that such teaching builds on a focus on first principles and basic concepts of the VFX production pipeline as opposed to memorizing button push sequences in a particular piece of software. Learning these principles regardless of any software considerations like package or version will enable students to transfer their knowledge to any applicable software application and to become well rounded practitioners in the field of visual effects.

In this paper we describe our breadth-first approach to teaching the VFX pipeline, implemented in a first year course within an undergraduate degree programme framework for technophile artists. Students are exposed to all aspects of the visual effects production pipeline in a holistic manner – in-depth exploration of the pipeline stages that are introduced in this course subsequently happens in other courses – in what we consider best practice for a gentle introduction to the craft of CG visual effects production.

The paper is organized such that following this introduction, in section 2, we examine existing and related work for digital arts curriculum design and different approaches to teach computer animation and visual effects. In section 3 we provide a brief description of our course and the educational environment in which it is delivered, an overview of the curriculum with brief summaries of the lessons that are part of this course as well as the coursework and assessment criteria. Section 4 discusses results achieved by students, our experience of delivering the course and student feedback, as well

as the evolution of the course and its assessment, while section 5 provides some concluding remarks and observations.

## 2. Related Work

Over the past two decades there have been various attempts to establish clear guidance for higher education programmes and courses related to the creative industries, although the available material that is not linked to computer science programmes, instead focussing on the art, design and craft aspects of computer animation and VFX, is limited.

The multi-disciplinary and highly technical nature of the domain also tends to cause difficulties for film schools and art schools [Ebe97], partially in understanding the domain but especially in terms of structuring of digital art focussed degree programmes or courses with regards to the introductory Computer Graphics sequence in an art, design and production context. Cumbie-Jones [CJ01] proposed a solution that involved a set of related, parallel courses in the second year of the students’ studies that each introduce different aspects of the production process but inform one another and share elements of their assessments, while at a liberal arts college, Orr [Orr01] introduced a short (3-week) course providing an introduction to computer graphics and computer art as an alternative to traditional arts courses.

Wolfe et al. [WLM\*03] identified commonalities in required skills and knowledge for computer graphics related career paths and in that context examined the requirements for building domain specific degree programmes while Schmidt et al. [SJMS04] highlighted the need to understand all aspects of the domain, stating that “although most animation students will rile at the thought of studying the fundamental maths behind 3D graphics [...] this is the best way to approach 3D animation and prepare yourself for the future”. They also identified the difficulties of teaching and learning these skills as partially stemming from the multi- and cross-disciplinary nature of the domain that requires a synthesis of knowledge from computing, art, design and production [OAL\*07], which was also recognized by McDonald and Luecking [ML02] who suggested the creation of different introductory computer graphics sequences based on the desired career paths that students are aiming for.

Ebert and Bailey addressed the interdisciplinary nature of computer animation and visual effects through a 15 week long course that joins students from different disciplines and degree programmes – computer science and visual arts – for an animation production group project [EB00] that includes a 3-week introduction with exercises and a practice project that runs into a main 12-week animation project. This project course is different from other types of introduction to computer animation and VFX though as the students from different disciplines will only gain a limited understanding of the other disciplines that contribute to the production. The manner in which the project is conducted though shows similarities to the activity-led instruction sequence [APH\*12], and student centred teaching and learning approaches built around projects [NLKA07] seem common for courses in this domain.

While there exist recommendations for computing curricula that encompass technical computer graphics [ACM13], for digital arts and especially for VFX, very little information is available in

terms of comprehensive curriculum recommendations, although some initiatives and developments have tried to address this shortfall [Ebe02, Kha02]. The Digital Art curriculum framework developed by the ACM SIGGRAPH Education Committee [TWGL08] is a step in the right direction, but it only describes the desired core competencies in very loose terms while acknowledging that one of the greatest challenges is educators' "disinterest caused by the misunderstanding that a core curriculum in Digital Art is unlikely to be agreed upon or is unnecessary". Industry has a different view, however, as shown by the review conducted by Livingston and Hope [LH11], which identified a need for development in course curricula and further expansion and improvement of degree programmes while highlighting good practice pioneered by several providers of existing degree programmes.

On the other side of the spectrum, the need for the more technical computing and computer science students to develop an understanding of the arts and artistic processes has been recognized and successfully implemented [Gar97, CMA09, SSZ16].

More recently the UK sector skills council for the creative industries "Creative Skillset" (recently renamed to "ScreenSkills"), an industry-led skills body that accredits training and degree programmes and acts as a lobbying organisation, developed a model curriculum of 12 modules [Cre17], first introduced in 2011, that covers skills from different areas of CG film effects, computer animation and video games production that are considered essential by the creative industries. Giving special consideration to the needs of the creative industries, Palmer et al. [PRD16] describe their approach to the design of a current and employment-focussed set of VFX, animation and games undergraduate programmes, stressing the importance to include the views and recommendations of industry professionals in the course designs, also recommending the integration of industry professionals into the courses as part-time teaching staff.

### 3. A Course Introducing the VFX Pipeline

We deliver our course introducing the VFX pipeline at the National Centre for Computer Animation (NCCA, Bournemouth University, UK), where it has run for the past four years, shared between a total of six different undergraduate degree programmes (three programmes [CMA10] that are in the process of being retired and three similar programmes that have been designed to replace them, including a bespoke "visual effects" programme) that prepare students for work in the creative industries and could lead graduates into careers in the feature film visual effects industry. The course, titled "Introduction to Production Tools", is worth 10 ECTS credits and runs in the first semester of the first year of our undergraduate programme framework. The aim of this course is to expose students who have little to no previous experience in visual effects, or any other form of computer graphics, to the basics of the visual effects asset creation and live action integration pipeline [Dun14]. Teaching on the course focusses on fundamental principles and practices of VFX production, introducing students to the software tools used in the production of 3D computer animation and visual effects. Students are guided through the creation of a photorealistic final shot, providing them with necessary knowledge and understanding of the core principles of each of the areas of the pipeline, and an appreci-

ation of how those areas work together to create the final shot. This provides a foundation on which students can build in subsequent courses during their degree.

#### 3.1. Introduction to Production Tools

Informed by the course tutors' extensive experience in the visual effects industry and benefiting from frequent communication with current industry practitioners who were also consulted for designs of the degree programmes, this course provides novice students with a guided tour of the VFX pipeline.

As this is a course that is shared among several undergraduate degree programmes, the students of the course cohort come from different disciplines with a wide range of different prior knowledge (or lack thereof), with some students having little to no computing experience or technical background, or much in the way of experience of more technical considerations like the mathematical foundations of three dimensional geometry, while other students have had no knowledge or experience of visual arts, computer graphics or animation. As the various degree programmes have their own discipline-specific courses for covering the CG and animation aspects that are relevant to them, the modules/lessons in the course discussed here are intended to be delivered to students who want to learn the visual effects production process from an end-user perspective, avoiding the technical, mathematical or software development topics that are not essential for an understanding of the VFX production pipeline.

To that end, this course follows a breadth-first approach, with different stages of the VFX pipeline not handled in great depth – detailed explorations is deferred to different courses that students take in later semesters – but instead the whole of the VFX pipeline is introduced and covered with enough detail to equip students with sufficient understanding of underlying principles and concepts as well as practical knowledge of the tools to allow them to produce an effective, realistic, 3D computer animation and VFX shot to completion.

As such, the intended learning outcomes of this course are that having completed it, students are expected to be able to demonstrate the practical use and understanding of visual effects and 3D computer animation within a production pipeline, furthermore demonstrate the ability to work with appropriate software and hardware to implement a production project to a set design and finally to be able to complete a set visual effects and computer animation project to a deadline, for which they need to develop both practical and observation skills as well as critical judgment, in other words "an eye" [Fre07] for the visual quality of rendered images.

In this course we use Maya<sup>†</sup> for 3D modelling, animation and rendering, Photoshop<sup>‡</sup> for texture creation and Nuke<sup>§</sup> for compositing. Nevertheless, delivery of the course is essentially platform agnostic, focussing on basic principles and techniques instead of software specific user interfaces so that once students have learned

<sup>†</sup> Autodesk: <https://www.autodesk.com/Maya/>

<sup>‡</sup> Adobe: <https://www.adobe.com/Photoshop>

<sup>§</sup> The Foundry: <https://www.foundry.com/products/nuke>

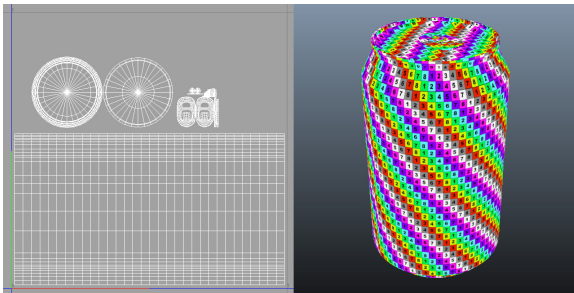


what they need to do to accomplish a specific operation it is just a case of finding where the button is located in whatever software package they are using.

The duration of the course is 1 semester (15 weeks), split into 12 teaching weeks for guided workshops and 3 production weeks dedicated to the coursework assignment. For the 12 teaching weeks, students are given a weekly 2-hour guided workshop (delivered to groups of approximately 40 students at a time) with some topics spanning several workshops, introducing the core skills that students can apply to their own practice and projects, and utilise for the completion of the assignment. Most of the tasks the students complete as part of the workshops can be categorised as incremental [PA14] as each step in the pipeline builds on the previous steps, culminating in a final finished asset and scene integration and students are expected to complete each stage of the pipeline in their own time between workshops. The same processes completed in workshops are also mirrored in the assessed coursework assignment for the course – a single piece of coursework (section 3.2) – that requires students to complete each part of the asset creation pipeline for the creation of a high quality CG asset, and then to integrate this 3D asset into live action background photography (backplate) to give a photorealistic end result (Figure 1).

### 3.1.1. Course Curriculum

While there exists no single definition for a visual effects pipeline, there nevertheless are common aspects that can be found in most production companies [Kaz16], allowing the identification of core concepts, tools and techniques. The syllabus is organized in a manner that maps the different stages that are common to most VFX pipelines onto a set of modules (lessons) that each encapsulate specific tasks and their corresponding skillsets that are essential for each VFX pipeline stage.



**Figure 2:** UV layout of the model & checker texture map on model.

The modules covering different areas of the VFX production pipeline in our course are as follows:

- **Modelling:** Creating 3-Dimensional polygonal geometry – The first stage of the pipeline is the creation of the 3D scene, setting up the virtual camera and sculpting the 3D models, which in our course involves basic hard surface modelling for subdivision surfaces and the use of procedural modelling tools provided by the 3D software (Figure 8).
- **UV Creation and Layout:** Unwrapping the 3D model to create a UV layout – The next stage in the pipeline prepares the 3D

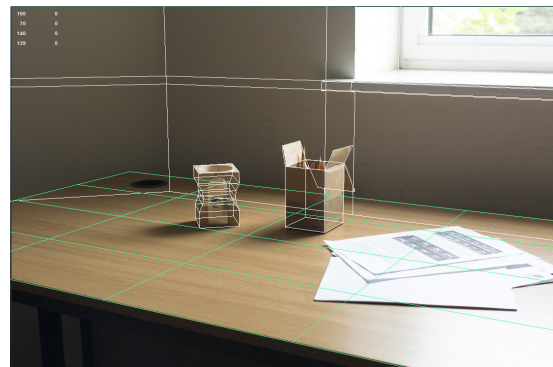
model for UV mapping [Cat74, BN76] through the creation of an atlas (UV layout) [MYV93], mapping pixels on the faces of the 3D geometry onto a 2D surface for texturing (Figure 2).

- **Texturing:** Creating the colour texture maps for the 3D model, as well as secondary maps to control the specularity and the roughness of the surface material of the 3D model – The next step in the pipeline is to create and place a colour texture onto the 3D model [Van03], which involves authoring the texture in a 2D paint program, building on the UV layout created in the previous stage and by consulting reference imagery (Figure 3), and adding additional elements that influence surface appearance such as a bump-map [Bli78] or a specular map [BN76].



**Figure 3:** Final texture map applied to the 3D model.

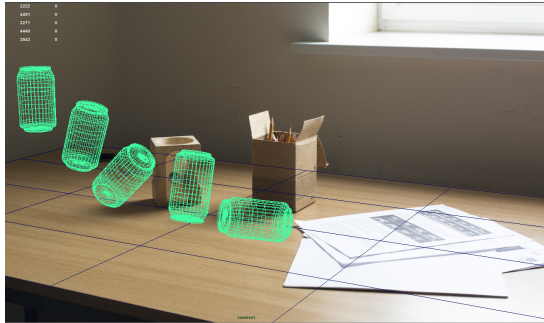
- **Preparing Proxy Geometry:** Creating geometry representing the real world objects in the background photography that the 3D model will interact with – To prepare the 3D scene for integration with a ‘live action’ backplate, the next pipeline stage is the creation of proxy geometry, ‘dummy’ models and geometry (planes/faces) that will not be rendered (Figure 4) but that 3D models can interact with or reflected on, and matching the virtual camera to the camera of the backplate.



**Figure 4:** Backplate with simple proxy geometry for the environment.

- **Animation:** Using a basic rigid body dynamic simulation to animate the 3D model doing a simple movement – The next pipeline stage creates an animation and first requires integrating the 3D model with the proxy geometry into a single scene. This allows the interaction of 3D model with the scene through the software’s physics and dynamics capabilities by applying gravity and a set of simple initial settings (e.g. velocity, direction and rotation) to

the model to create a simple physics-based animation of the object falling, bouncing and rolling on a surface (Figure 5) without the necessity of introducing tools or techniques (such as rigging and hand animation via keyframes), that could be considered overly complicated for an absolute beginner but could be used instead.



**Figure 5:** The model at different frames in the simulation animation.

- **Lighting:** Using manually placed lights to recreate the real-world lighting in the background photography – The next stage of the pipeline and the first step to achieve photorealistic integration between CG images and live action footage is performing a process called “light match”. This involves adding digital light sources to the CG element in order to create a lighting set up that matches the live action background plate in which the digital object is going to be placed. The CG object “must be lit in a manner that seamlessly blends the CG into the live-action plate” [OZ10], which in a VFX production company would often involve the use Image Based Lighting (IBL) using a reflective light probe (chrome sphere) [Deb02] to automate this process, or a neutral (coloured – usually light gray) sphere [OZ10] to aid manual light-matching (Figure 6).



**Figure 6:** Reference images: photograph & light probe.

- **Look Development (Lookdev):** Creating the surface shader properties of the 3D model and rendering each of the individual elements of the final shot (e.g. shadows, reflections etc.) – The penultimate process in the creation of our 3D model integration shot is to complete the shading and rendering aspects of the pipeline, for which separate render passes are set up with which the final scene can then be constructed during compositing (including a ‘beauty pass’ for the texture using a basic diffuse Blinn shader [Bli77] combined with the bump map [Bli78] with other passes such as specular highlights, ambient occlusion, shadows and the reflections rendered separately – Figure 7) or alternatively by using a physically based renderer.

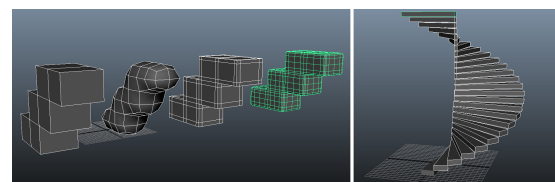
- **Compositing:** Combining the render passes and integrating them into the background photography – Digital compositing can be considered the last stage of the pipeline, where all the elements generated during the 3D production stage and rendered as a 2D sequence of images are combined and manipulated, in order to produce an integrated result. The teaching activities for this part of the pipeline need to strike a balance between artistic knowledge, essential for learners to judge visual quality and achieve photorealism [Wri10] and craft skills, i.e. technical training, which is essential to generate technically correct visual results (Figure 10).



**Figure 7:** Individual render passes and the final combined frame.

### 3.1.2. Lesson Summaries

Teaching is delivered as a set of practical workshops in which the educator covers the lesson material on a teaching workstation in the computing lab, projecting their workstation’s output onto a large screen, with the students following along. Lessons generally start with a brief introduction to the background of the workshop’s topic, a quick look at the intended outcome of the lesson, and a brief discussion to preempt any problems that might arise.

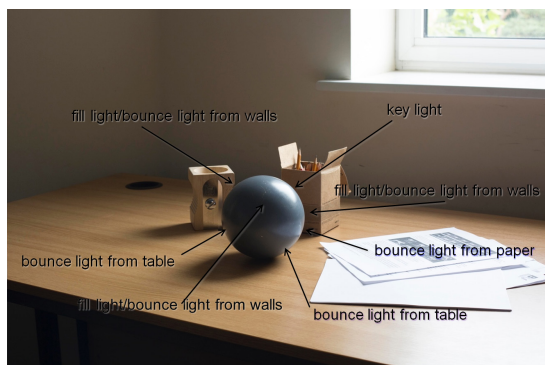


**Figure 8:** Left: Extruded cubes showing the effect of supporting edges for sub-division – Right: Simple spiral staircase model, demonstrating the use of procedural modelling techniques.

- **Modelling:** The first and one of the most important lessons introduces fundamental 3D concepts [HvDM\*13], explaining what three dimensional geometry and 3D world space are, also covering the basics of 3D scenes with regards to coordinate systems, cameras, clipping planes, normals, and backfaces, the components of 3D geometry (faces, edges and vertices). This lessons also covers 3D transformations for models or their individual components, modelling using subdivision, with edge loops [RM98], and with the procedural tools of the 3D modelling software, e.g. by ‘lathing’ [Paq08] (Figure 8).
- **UV mapping:** This lesson covers the concepts of UV coordinates and UV unwrapping, demonstrating the process with a prop in the form of a small cardboard box by unfolding the box and showing how it looks when laid out flat, and how the same can

be achieved with polygonal geometry to create a UV layout (Figure 2).

- **Texturing:** This lesson extends the UV mapping lesson with basic UV hard surface texturing, demonstrating how some elements of the texture can be created and processed from scratch within the image editing software and how hand painted and externally sourced components can be combined with the UV layout to create the final texture (Figure 3).
- **Proxy Geometry:** The next lesson demonstrates the creation of proxy geometry and the process of matching the virtual camera to the backplate, emphasizing that the focal length of the virtual camera must match that of the real camera used to shoot the backplate. Once the focal length has been established, and the virtual camera created, students are guided through the process of creating a polygonal plane that is aligned with background photography by moving (orbiting) the camera around the plane (Figure 4). Objects in the scene can then be modelled using simple primitive objects and any additional detail can be added using previously taught techniques for adding edge loops and extruding faces (Figure 4).
- **Animation:** The animation lesson shows how a scene can be created by combining 3D models from different files and guides students through the creation of a simple rigid body dynamic simulation, explaining that the simulation is re-calculated each time it is reset, highlighting that it is not a set of key frames, so the process of ‘baking’ the simulation to keyframes is demonstrated.

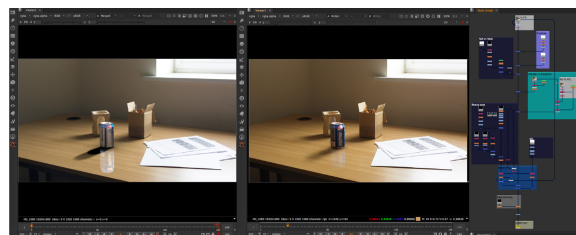


**Figure 9:** *Lighting set-up analysis.*

- **Lighting** In the lighting lesson, which focusses on manual light matching for live action integration [Bir14], before starting the practical light placement in the 3D scene, students are required to analyze the different light sources that exist in the reference (Figure 6) and how these affect the grey sphere carefully annotating the lighting set up (Figure 9). They then recreate the lights and integrate them in the scene.
- **Look Development:** This lesson introduces various options for shading and rendering of a shot, such as using a physically based renderer, but emphasizing that in the industry VFX shading and look development artists must be able to perform manual shot composition and generate separate render passes that are the main topic of this lesson. The aim is for students to develop an understanding of the construction of a shot and its individual el-

ements, while gaining control over the final look of the composition. This involves learning how to split shadow passes into separate soft- and hard-shadow passes. Students are reminded that parts of the environment that have a reflective surface may need to reflect the 3D models in the scene and they are shown how to generate a suitable environment map for the reflection pass.

- **Compositing:** The final lesson teaches how a final shot that looks “real” that makes observers believe that everything in the scene was “photographed at the same time, by the same camera” [Bri08] is produced through compositing. Special emphasis is given to the careful analysis of reference images that provide clues regarding the combination of the different render passes (Figures 7 & 10). Students are guided through the process of combining different render passes through the use of appropriate operations such as blending.



**Figure 10:** *Render passes combined on background plate (left) & final integration process (right).*

### 3.2. Coursework Assignment

The assignment takes the form of a 3-week project that encourages students to take responsibility for the planning, execution, and presentation of their work while fulfilling the requirements of a set project brief. It assesses the students’ ability to effectively model, UV, texture, shade, light, animate, and render a high quality CG asset in the form of a drinks can. It also assesses their ability to composite their asset effectively onto live action background photography.

To ensure that all learning outcomes for the course are met, in this project there are various different restrictions for each part of the pipeline that reinforce the necessary core principles of each of the disciplines, such as limitations to polygon count and number of UV tiles (separate texture files per model) or the requirement of having to use separate render passes and compositing techniques as opposed to physically based rendering and other automated lighting techniques.

Some assets (e.g. background plates) and reference material are provided for the students, along with other supplementary resources such as background location information and video tutorials, as “especially for workshops on specific disciplines it is often better to provide video tutorials for the students to follow along, but these should be provided to complement the workshop and not as a replacement” [ADLR17]. The assessment submission must include the final rendered shot as well as supporting working files (Maya, Photoshop, and Nuke files etc...) and students will achieve fewer marks for every element of their final piece that falls short of the assessment criteria.



### 3.2.1. Assessment Criteria

The main criterion for assessing the coursework is the overall photorealism of the submitted shot – for a high level of photorealism the final piece should match the reference images in terms of lighting direction, colour, saturation and brightness – with the remaining assessment criteria mapping to the covered stages of the VFX pipeline:

- **Modelling:** The model must have a sensible number of faces, i.e. the drinks can mesh (including the ringpull) must not be too heavy (dense) or subdivided too much with no more than approximately 1500 faces (3000 triangles).
- **UV Layout:** UVs must be laid out in a sensible configuration with the UVs for the can and its ringpull placed on a single UV tile with a uniform resolution, filling as much of the tile as possible.
- **Texturing:** Colours should match the reference images in terms of brightness, contrast and saturation [Van03] and the texture must have a sensible amount of detail, i.e. avoid details that are not visible in the final render.
- **Proxy Geometry:** The environment proxy geometry must be modelled accurately as inaccuracies can result in wrong shadows on the backplate or animation not interacting accurately with the background environment.
- **Animation** The animation should be realistic in terms of the effect of gravity on the can and look natural, avoiding unnecessary spinning on or sliding across the surface or bounce unnaturally.
- **Lighting:** Lighting of the can should match the reference photos, and especially its shadow must be an accurate match to the reference photos.
- **Look Development:** The surface appearance of the can must match the reference regarding specular (shininess), reflectivity and bumpiness as well as overall brightness, contrast, and saturation.
- **Compositing:** The render passes have to be composited correctly and all required render passes must be present with the overall look of the final composite image matching the reference [Bri08].

## 4. Discussion

Over the four years that this course has been running, approximately 500 students have gone through the workshops and completed the associated assessment. The assessment has a pass rate of approximately 85%, with over 50% of those students gaining a mark of over 60% and the general performance of the students, in terms of the quality of work produced, is very high.

For those students who do not perform very well or even fail the assessment, the main reason appears to be a lack of comparison of their work to the provided reference images. It is therefore necessary to constantly emphasize the importance of comparing work to reference images, both throughout the workshops, and especially in the coursework brief. We have found that it is also important to reinforce to students that they should compare every aspect of their work (model shape, texture colour, surface material properties, movement) to the reference images provided as well as to reference images that they acquire themselves.

### 4.1. Course and Assignment Evolution

For the first two years that the course ran, the animation module animated objects by hand with basic keyframes that students had to manually set, which was reflected in the assessment for which students had to be provided with an existing animation rig – rigging and animation are covered in depth in subsequent courses – which caused problems, as not enough time could be dedicated to teaching animation skills and during the assessment students spent a disproportionate time trying to get the animation to “look right”.

As a result, the syllabus and assignment were adjusted, and for the last two iterations of the course, animation is done using a simple rigid body simulation, animated with the dynamics tools provided by the 3D modelling and animation software, leading to much improved outcomes.

### 4.2. Student Evaluation

In general the students enjoy the workshops and have commented about them favourably in collected feedback and course evaluations. In course evaluations conducted by the university the majority (>85%) of students agreed that faculty made the subject interesting, explained the taught materials well and provided clear assessment criteria. Similarly, the overall response to the coursework assignment from the students is very positive and student feedback has included comments such as “it’s the class I enjoy the most” or “overall a challenging, but interesting project. I like the idea of achieving photorealism”.

## 5. Conclusions

In this paper we have outlined our breadth-first approach for teaching essential key areas of the visual effects post production pipeline to novices. We have seen that students successfully acquire the necessary level of knowledge and skills that they need for their further studies by means of a combination of tutorials, workshops, self-directed learning activities and on-line learning.

Both in terms of reception by the students as well as the produced results, the drinks can coursework assignment has proven to be an effective way of assessing the students’ knowledge and understanding of each of the individual parts of the asset creation pipeline, as well as how those parts fit together to create a final shot and also assesses the students’ ability to effectively compose a final photorealistic shot by making use of the techniques of appropriate reference observation and compositing. Many of the students achieve a high level of realism and photo-real quality in their coursework, making it difficult for experienced faculty members to distinguish the coursework and real video footage.

To conclude, we believe that the quality of the work submitted by the students that the lessons that form part of the course are an effective way of teaching the basics of the visual effects pipeline to novices providing students with a basic level of knowledge and understanding of the core principles of each of the discipline areas, as well as necessary skills and hands on practice in the production of a CG asset and the integration of that asset with live action background photography. As such we consider this course a model of “best practice” for teaching the 3D artists’ introductory computer graphics sequence.

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