MUTATING THE REALITIES IN FASHION DESIGN:
VIRTUAL CLOTHING FOR 3D AVATARS.

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ABSTRACT

> "My fantasy is to be Uma Thurman in Kill Bill…and now I can…
> I'd pay $10 for her yellow jumpsuit and sword moves and I'm sure other people would too… [1]

Hundreds and thousands of humans living in different time zones around the world are choosing to re-create and express themselves as three dimensional avatars in 3D virtual online worlds: An avatar is defined as an interactive 3D image or character, representing a user in a multi-user virtual world/virtual reality space. [2]

3D virtual online worlds such as Second Life, and There, offer low entry costs, to actively encourage user generated content and creative social development projects. The residents of Second Life are in full control of their avatars through a highly visual, interactive software interface of 3D tools.

Consumer buying trends in both virtual and physical worlds are merging through faster bandwidth and integrated 2D and 3D technologies. Fashion, identity and styling your avatar, is possibly one of the most consistently, popular activities in virtual worlds. Fashion business is booming in 3D virtual worlds; and clothing designers are experimenting with design, manufacture, marketing and promotion. In Second Life men's and women's wear designers are creating diverse ranges of styles, using digitized buttons and fabrics, and using 3D physics tools to simulate the movement. There is also a huge boutique market selling unique and unusual made to measure creations for uninhibited virtual customers, and for the less adventurous high street fashion and sportswear ranges are now available in virtual worlds.

3D Virtual worlds can provide powerful 3D design communication and visualization tools for fashion learners and the clothing/textile industries. This paper discusses the potential for fashion students and academics in using 3D virtual worlds for teaching and learning in fashion education. The main section of the paper outlines the 2D-3D digital design process for changing the appearance of the avatar and designing clothing in Second Life.

1. INTRODUCTION

This paper describes my first experiences inside the 3D virtual world of Second Life. The main objective of the research is to begin learning how to design clothing for a 3D avatar in Second Life. The research is intended to be a basic introduction to the development of clothing design methods in the virtual world for fashion learners and academics. Firstly, the paper provides background on 3D virtual worlds. The main section is in two parts, the first explains how I began being an avatar in Second Life and experimented with the avatar tools and menus. The second section describes how I altered and styled the avatar and also used Adobe Photoshop to two dimensionally design and customize 3D virtual clothing in Second Life.

2. BACKGROUND TO RESEARCH

In the infinite spaces of 3D multi user virtual worlds, hundreds often thousands of people negotiate virtual spaces as avatars, 3D characters that are representations of the human user when inside a virtual world. 3D interactive virtual worlds such as 'Second Life';[3] 'There',[4] and, 'a tale in the desert'[5] provide low cost, socially constructive, and very creative experiences. The interactivity in 3D virtual worlds is acutely different, than the highly popular but, excessively violent, shoot 'em up multiplayer online gaming environments.

3D multiplayer/user virtual environments have significantly changed the nature of the computer game as we previously knew it; you, the user are no longer playing a game or against the game, through preset levels, constrained and only evolving as the game developer has determined. For example in Second Life, residents develop personal property, have projects and are responsible for their own original content in the world. The ideas and actions of each resident shared with those of other people and their ideas make everyone's virtual experience incredibly organic, unpredictable, open-ended and spontaneous.

2.1   3D Virtual Worlds for Learning and Teaching

The cultural engagement and interest in recreational and educational gaming has led to increased research into 3D gaming technology and engagement/learning theory, focusing on the effect of using games in practice, for training and to develop the structure of cooperation in game play situations.[6] [7] The serious implications of gaming in education are still relatively new, but the application potential is rapidly unfolding.[8] As Balkin[9] predicted in 2004, we are now not far away from seeing what the use of virtual worlds in training and education can really teach us.

> "As multiplayer game platforms become increasingly powerful and lifelike, they will inevitably be used for more than storytelling and entertainment. In the future, virtual world's platforms will be adopted for commerce, for education, for professional, military, and vocational training, for medical consultation and psychotherapy, and even for social and economic experimentation to test how social norms develop. Although most virtual worlds today are currently an outgrowth of the gaming industry, they will become much more than that in time." (Balkin, 2004)

The first multi user dungeon role playing game MUD 1 was created and launched in 1979. Active worlds became available online in 1995, at the time AV was the only virtual environment to encourage its residents to not only chat, but also to collaborate and develop content through networking projects and use of basic building tools. [10]

Universities have recently begun to develop their own 3D virtual environments for learning and teaching, these spaces are being applied for collaborative design projects in art and design and fashion education. Ratava's Line, shown in image 1, is an online, interactive 3D virtual fashion distance learning project, created collaboratively by students at both the Fashion Institute of Technology (FIT) in New York City and at Interactive Arts at Simon Fraser University (SFU) in Vancouver, Canada, using emergent, collaborative 2D and 3D systems. [11] Image 2 is a screen shot from a one year distance learning fashion project. Three FE colleges worked on a catwalk project using a virtual fashion gallery, developed by the University of the Arts London College of Fashion ITRDU Information technology research & development unit. Students and tutors used the 2D/3D virtual gallery for presenting on going work, peer/academic communication and formative assessment. [12]

Image 1   **Image 2**   **Image 3**

An online 3D virtual interactive School of Art &Design project is being developed by 3D design, fashion, and design business academics at the University of Huddersfield. Image 3 shows a student avatar listening to a speech by Patrick Stewart, the Chancellor of the University of Huddersfield. The project is focused on developing innovative new methods for independent and collaborative learning and teaching within the school and satellite/franchise courses. [13]

3.   SECOND LIFE: A INTERACTIVE 3D VIRTUAL WORLD

Second Life is a 3D virtual online world originally created and supported by a company called Linden Lab located in San Francisco. The world and its land mass is entirely inhabited, owned and built on by its residents. Since opening to the public in 2003, it has grown rapidly and today is occupied by an estimated total of 4.5 million people from around the globe. [14] The real life users of Second life are represented in world as avatars and describe themselves either as residents or avatars of a 3D virtual environment or online multi user world. Rushe [15] describes some of the everyday realities in Second Life,

"Over a million people build homes, make love and live new lives here. But even though this world exists only in their imaginations, some people are making six figure salaries, and corporations are moving in."

Residents have many diverse ideas and motivations for exploring in Second Life such as flying into space on a giant cat; pole dancing around a tree on the bus, being very rude to strangers, making opposites of yourself, partying in a ultra chic interactive virtual night club, mutilating your avatar, windsurfing in the earth's core, or simply relaxing, enjoying some retail therapy and pampering your avatar in the health spas, shopping malls and fashion boutiques.

The main focus for residents in Second Life is to experience being different and playing with ideas of self or changing something that you are in real life; also to have an opportunity to experiment, express and re-present one's self in alternative ways in the presence of supportive, diverse groups of unusual people. The popularity of life styling and its potential to develop innovative and alternative ideas through programming and animation makes anything possible and at the same time creatively challenging.

3.1   Fashion and Lifestyle in Second Life

Online shopping is hugely popular with virtual residents looking for the (un)usual consumer items necessary to live the ultimate virtual life. Adidas, Toyota, American Apparel and IBM have built virtual stores in Second Life; this indicates that 3D virtual shopping has caught the online user's imagination. Raz Schionning, American Apparel's director of Web services, admits to some initial ambivalence about the Second Life store, which opened June 21 2006. Clothes sold in Second Life are often racy, "Matrix" inspired styles. "I wasn't sure if the concept of selling T-shirts to that audience was going to fly at all," he says. Since then, though, the store has sold some 4,000 items, catering to residents who want their avatars to dress in the same style as they do in real life. [16]

Virtual fashion magazines[17] [18] that promote the current Second Life trends, interviews, style tips, events and show the latest designs and collections from Second Life fashion designers are more popular than Vogue in virtual world communities. New York fashion week was, for the first time ever, simultaneously happening in Second life and SL's top fashion designers Callie Cline, Simone Stern and Paper Couture were featured in an iVillage fashion show.[19]

3.2   Education in Second Life

Second Life is providing a unique and consistently flexible space for educators interested in developing distance learning, computer supported cooperative work, simulation, new media studies, and corporate training.[20] Linden Lab appears to positively support educational development through a program called Campus Life. Campus life,[21] offers support and provides assistance to Universities, faculties or lecturers interested in teaching courses using Second Life. Wong [22]comments that, "the classroom of the future isn't on a college campus. It's in the virtual world of Second Life."

The 3D interactivity, avatar self expression and text and voice communication in second life, is an important motivator for educators to test Second Life as a tool for learning, in every subject imaginable. "I think that is one of the things that's so attractive to educators using Second Life," confirms Linden Lab community developer Claudia L'Amoreaux aka Claudia Linden in Second Life. "The quality of interaction is hard to even describe. It doesn't replace face to face, but it does enable working with people all over the world." [23]

The evident views of Claudia Linden are conclusively reflected by the increasingly expanding list of over 150+ different universities, colleges, laboratories, libraries, and educational organizations that are independently or collaboratively developing new learning modules and courses in Second Life.[24] [25] College Lasalles, in Canada are one of the first institutions to offer creative arts courses such as fashion marketing and interior design using online courses in Second life, to extend the opportunities for learning to all students regardless of physical location. [26] Educational projects are being delivered in diverse subjects such as astrophysics, engineering, climate and environmental change, mathematics, spaceflight, languages, cultural studies, history, architecture and urban planning projects.[27] [28]

4.   VIRTUAL CLOTHING DESIGN IN SECOND LIFE

This section describes my experience of entering Second life for the first time, exploring the world, being Ay Taov, and changing my avatar and learning to design clothes using Adobe Photoshop and Second Life. I have attempted to describe as sequentially as possible the process and the methods used for altering the avatar and for learning the basics of clothing design.

4.1   Teleporting into Second Life

To become a resident in Second Life, go to www.secondlife.com. I opened a free account, and chose a name for my avatar, which is Ay Taov. The registration form requires basic user information and also asks that I select a temporary avatar to get into SL, which can then be changed on arrival. New members or residents to SL, are limited to selecting from a range of basic female, male or animal avatars. I choose the brown fox avatar with a bushy ringed tail. Membership details, identity and avatar selection are quickly completed and I am teleported into the virtual 3D World that is Second Life, as a fox. Teleportation is the fastest mode of transport for avatars, and will instantly materialize you to any location in SL or you can fly or just walk.

Image 1; shows Ay Taov, Second Life avatar, as the bushy ring tailed fox, standing next to a tall Japanese goth, and a plain girl in the middle of changing her appearance in a virtual mirror, it was a very unique and remarkable moment. All these avatars, are the first time residents just arrived. Their human users are all seeing and sharing the same experiences; learning how to navigate, walk, talk, fly, change clothes, use physics for moving objects and acquire etiquette and other life skills in preparation for their virtual adventure into Second Life.
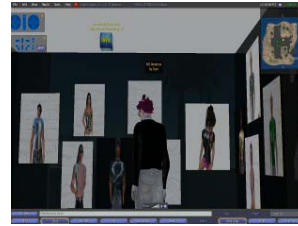
Image 4   **Image 5**   **Image 6**

4.2   Changing an Avatar's Appearance

Signposts offer sartorial help for enthusiastic new arrivals, keen to experiment with their avatar's appearance. Right mouse button clicking on the avatar, will open the avatar function menu, select the *appearance* menu and the 3D avatar image interface shown in image 2, instantly pops onto the screen enabling the user to make very changes to the avatar.

Experimenting with the avatar *appearance* tools is great fun. The interface is very intuitive and tools are programmed with scrolling, clicking and dragging functions to help the user develop instant, interactive 3D visualization directly on the avatar's body. I make multiple changes to my gender, body shape, hair, clothes and face, all in a matter of minutes. Image 2; shows the interface and tools to make the avatar change from brown ring tailed fox to Ay Taov, virtual fashion researcher. The *appearance* tools can change the size, scale and proportion on all parts of the avatar; skin, hair, face, lips, all body parts, size and proportion and make adjustments to the clothing. Further investigation into buying new clothes can be seen in image 6; as Ay Taov window shops and eventually buys a fitted London Bridge T-shirt. Buying low cost and free/sharing of clothing quickly encourages resident interaction use of folders and Second Life interface/tools. Buying desirable items of clothing also supports the creation and promotion of fashion designers who create a diverse range of unique styles, colours and shapes to fit any female, male, animal or mutant avatar body.

An avatar can only wear one skirt, one pair of socks, one jacket, at the same time. Putting a new item on in one layer takes off any item that is already worn in that layer. An avatar can have all its clothing removed, when clothing is being added or removed, there is a short delay before the change becomes properly visible to everyone else in the environment.

4.3   The Avatar's Wardrobe

A range of clothing layers, textures and fabrics are provided on entering Second Life and stored in the *inventory* folder that functions as a virtual wardrobe, clothes can be added, dragged/dropped or linked from the inventory onto any avatar. Click to select the item and it instantly appears on the avatar, replacing any other item already in the same clothing layer. An entire folder of clothing can also be dragged and dropped onto the avatar to change an outfit all together. Right clicking on a folder will give you three clothing-specific

options, add to outfit, replace outfit, and take off items, replace outfit works just like dragging a folder onto the avatar.

4.4   Clothing Design Basics For Avatars

Second Life provides all avatars with a free collection of clothing templates that are the separate areas for altering and mapping textures onto the avatar body. The templates can be located on the community pages of Secondlife.com[29] and can downloaded individually or in a complete set. Second Life/Linden Lab recommends using Adobe Photoshop or JISC Photopaint/ Paint Shop Pro for working onto the templates. The templates contain several layers for draw, paint, importing in images for layout and correct placement of designs, fabrics, and fastenings on clothing before they are uploaded onto the 3D avatar for wearing in Second Life. The avatar templates and the related body-garment sections are described in order and shown in images 6 to 9.

- Makeup (head and face. A hair template is available but not shown)
- Upper body (shirt, undershirt, upper jacket, upper tattoos, gloves)
- Lower body (Pants, shoes, underpants, lower jacket, lower tattoos, socks)
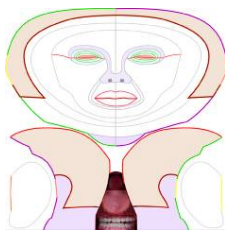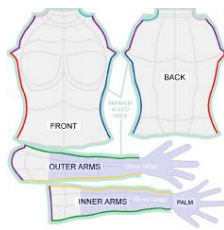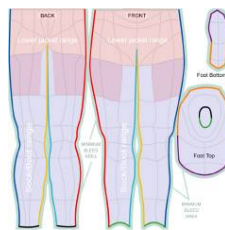- Skirt (Miniskirt, knee length, ankle length, floor length)

| Image 6 | Image 7 | Image 8 | Image 9 |

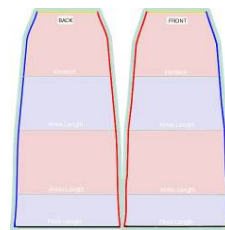## 5.   INTRODUCTION TO 2D-3D DESIGN IN SECOND LIFE

This section describes the methods that I used for learning to design fashion concepts, in 2D using Photoshop, then uploading them to Second Life for visualizing on the avatar interactively in three dimensions. A basic understanding of how to use paint, draw, move images, and also knowing how to use the layers functions in Photoshop, is useful for student designers when using this method.

Second Life templates are not intended to simulate the principles of traditional clothing blocks or patterns, but they do have a similarity, by being a 2D working template for construction as a 3D garment on a 3D body. The templates make full use of layers in Photoshop. Background layer, working layers and UV map are shown in image 11. Image 10 shows a UV map that is hidden on a layer below the working layer. UV maps are two

dimensional blueprints for a three dimensional object. The lines on the UV map describe the connected shapes that combine to make the avatar three-dimensional. [30]

5.1   2D Digital Print Design Developments

Image 12 is a digital photograph of a tree, imported into Photoshop and adjusted using filters to create as texture/material/print design. Image 11 shows a screen shot of all layers and the upper body template selected as the working layer. A red fill is added to the layer and using type tool a '09' logo was added to the centre of the shirt. Image 13 shows a second design on the upper body template, using a green fill and the paint tools/colour palette in Photoshop to create a horizontally striped short sleeved top.
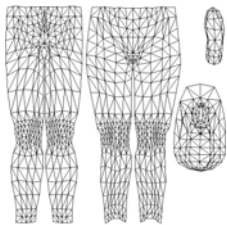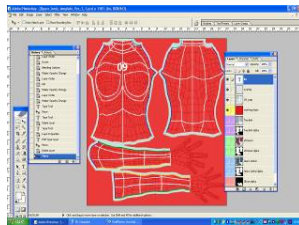

Image 10   **Image 11**   **Image 12**   **Image 13**

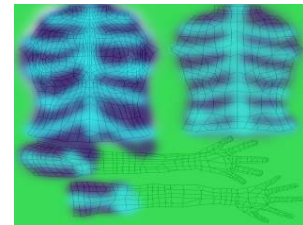## 5.2   3D Design Visualization

The templates and tree print design are saved as a .tga file and uploaded to the avatar inventory in second life. There is a cost of $L10 (Linden Dollar vs US Dollar 272.5 L$/USD at fluctuating rates) for uploading designs, clothes, objects and animations into the world, although, designs can be viewed on the avatar before making a final decision to buy. All changes made to the avatar/clothes happen in real time on the avatar. Image 14; shows an alternative design decision to add the tree design to the avatar face and body as a skin texture. Image 15; shows the London Bridge T-shirt has been removed and is automatically replaced by the default standard white top. Using the browser window to view with 360° 3D zoom tools enables the user to thoroughly check a new design or garment before uploading to the inventory and adding to the avatar. Image 16 shows the blue striped top added to the avatar, and the denim jeans are replaced with the red filled 09 logo long sleeved top which looked much more stylish as a all over print for funky red pants.
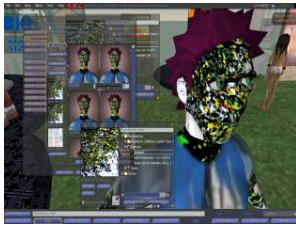
Image 14   **Image 15**   **Image 16**

6. CONCLUSIONS AND FURTHER WORK

This experiment has attempted to evaluate development of avatar identity, styling and clothing design using Second life to support and update some aspects of learning and teaching in fashion education. Based on the initial research and developmental work in Second Life, we conclude that the virtual environment has the potential to be used by all fashion students for 2D-3D design and range development, storyboarding, business communication, fit checking, catwalk shows, buying and retail.

For a designer, student or any creative user, the basic appearance slider tools are engaging and very easy to use, but these tools have limits for experimenting with original garment designs, and for creating more individualized avatar styling concepts. The placement and alignment of fabrics, prints, pockets or zips or buttons or over layering, transparency and other details that can make the avatar's clothing look highly individual, unusual, and customized was not directly possible when using the basic avatar *appearance* tools.

The 2D–3D design thinking and learning really began after the avatar templates had been downloaded. In Photoshop the 2D templates were digitally hand painted and prints added into the different layers making experimentation instant. The designs were saved, and then uploaded in Second Life and viewed in the 3D fashion browser. Finally, the design is checked, seams can zoomed into, placements are analyzed. If the design is approved, click select, and the avatar is instantly dressed with the 3D garments. The size, fit, lengths and proportion of both garment and avatar, can be further adjusted directly on the avatar with the *appearance* tools.

This paper has presented an alternative view for further potential development in fashion education and to encourage this work the researcher asks fashion academics to consider these questions. Fashion students and clothing industry are using established 2D CG/CAD tools for concept and pattern design, manufacture and communication.3D virtual modeling in 3D virtual environments is undoubtedly the next new tool for fashion learners in education, as many companies are now benefiting from use of 3D sample visualization software linked to PLM systems. As fashion designers and educators of material construction can we see and feel the beauty in the manipulation of virtual cloth, objects and spaces? Could 3D virtual worlds extend the traditional and physical learning and teaching experience within fashion education? What kind of new and innovative pedagogies could

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evolve from virtual studio fit checks and educational fashion events in 3D virtual space to change the future of our learning and teaching experiences?

6.1   Further Work

The researchers are currently involved in the development of a dedicated, 3D virtual interactive learning environment for the School of Art & Design at the University of Huddersfield. The objectives are to create open 3D virtual spaces, where students and academics can experiment, make, communicate, question and present ideas within a secure and collaborative environment. The research within this paper will hopefully go towards informing the evolution of courses that can exist in both physical and 3D university virtual spaces, yet are still also capable of merging with the web and becoming interconnected within the global virtual educational community. Any programming for educational content will be discussed with academics according to their specific educational or subject needs and requirements. For example creating a research space where all staff and students can participate as avatars, talk and share research without needing to meet physically.

The 3D interface in Second Life makes interpretation in the environment very quick and interesting for all users. The interface in the virtual university will also incorporate a range of programmed clothing, objects and basic primitives that can be altered to specific user requirements. The interactive 3D virtual learning environment will include on-line teaching support materials, link to 'live' lectures and provide real-time distance learning communication and teaching experiences for students on international/franchise courses. This research in Second Life has proved that the freedom of virtual space must not be limited by the developers of the environment. The developers are responsible for researching the needs of the users and making open environments for all users. Initial feedback from university academic groups has determined that when avatars are created, user testing developments will need to include environmental sounds, real voice for avatar speech, use of image/texture quality, character details, interaction between objects and characters using physics to simulate real world conditions.

Further work is on going; funding applications will provide the opportunity to create 20-30 different 3D avatars for using in the 3D spaces of the virtual school of art & design. The first stage development of the research project is completed; the second stage will use 3D modeling and animation software and interactive programming software to create the avatars and develop the functionality required to provide avatars and tools for groups of student/academics to learn virtually in three dimensions.

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