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Identifying an appropriate pedagogy for virtual worlds: A Communal Constructivism case study.

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Oldham, E., FitzGibbon, A., Girvan, C., Heap, G., Collins, M. & Savage, T. (2009) You can lead students to Second Life, but can you get them to immerse? In I. Gibson et al. (Eds.), *Proceedings of Society for Information Technology and Teacher Education International Conference 2009* (pp. 2318-2323). Chesapeake, VA: AACE

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Abstract

As increasing numbers of educators explore the use of virtual worlds for education, there is a need to consider which pedagogical approaches can provide an opportunity to do more than recreate the traditional classroom by leveraging the unique characteristics and potential that the technology can offer. This study identifies Communal Constructivism as a potentially appropriate pedagogy for use in the virtual world *Second Life*. Five groups of learners took part in a learning experience specifically designed to provide opportunity for the features of Communal Constructivism to emerge through the affordances of the technology. The chat logs, learning artefacts, post-activity semi-structured interviews and researcher's observations from each of the five groups were analysed to explore participants' experiences and both the operation and outcome of the pedagogy in action. Findings from the qualitative analysis of the data sets indicate that learners collaboratively constructed knowledge for themselves as a group and for others, as the features of the pedagogy emerged.

Keywords

collaborative learning; interactive learning environments; pedagogical issues; virtual worlds; teaching/learning strategies

1. Introduction

"Nobody wants to use technology to recreate education as it is" (Scardamalia & Bereiter, 1994, p. 256), yet as new technologies emerge early adopters recreate what has gone before in these new environments. Winn (2005) describes this as the natural reaction of early adopters to any new technology, however there comes a point at which there is a need to move beyond what a technology can replace and consider the unique characteristics and potential that the technology can offer. Virtual worlds are increasingly being explored by educators and educational researchers, resulting in an increasing body of work which looks to move beyond replication and the early adoption stage. Savin-Baden (2008) states that we are now at a point where we need to begin looking at the relationship between pedagogy and technology. One approach is to consider the affordances of the virtual world technology and explore potentially appropriate pedagogies that could leverage these affordances.

Savin-Baden (2008) notes that reported learning experiences in virtual worlds often lack pedagogical underpinnings. This paper considers the perceived educational affordances of virtual worlds and identifies Communal Constructivism (Holmes, Tangney, FitzGibbon, Savage & Mehan, 2001) as a pedagogy that could potentially leverage these to create a successful learning experience. Unlike Dickey (2003) who explores the pedagogical affordances of *Active Worlds* through the use of a specific pedagogy, we pre-identify the perceived educational affordances from the literature and use these to identify a theoretically appropriate pedagogy. This is followed by a description of the activity designed and data collection to explore both the operation and the outcome of the pedagogy in action. We then

1 present the results and discuss the findings and their implications. Thus, this paper
2 demonstrates that appropriate pedagogies can be identified based on the perceived
3 educational affordances of a virtual world, an approach which may support educators in their
4 use of virtual world technology.
5

6 7 8 9 *1.1 Virtual Worlds*

10 Virtual worlds provide a three-dimensional online environment populated by multiple users
11 who are represented through the use of avatars and can communicate with each other. While
12 the form of the avatar and modality of communication may vary from virtual world to virtual
13 world, avatar and communication tools are generic features across virtual worlds. There are,
14 however, features which may or may not be present in individual virtual worlds, for example
15 the construction of objects in the environment is available to users of *Second Life*, limited for
16 users of *There* and unavailable to users of *Club Penguin*. Unlike the oft institutionalised
17 virtual learning environment, virtual worlds provide a flexible learning environment for both
18 educator and learner. They are immersive and persistent (Castronova, 2005), providing
19 opportunities for users to collaborate and experience shared environments without requiring
20 physical co-presence.
21

22 Some studies exploring the use of virtual worlds for education have made links between
23 features of the technology and learning approaches, with much of the recent literature on the
24 educational use of virtual worlds focusing on *Second Life*, developed by Linden Labs. Role
25 play, as explored by Jamaludin, Chee & Ho (2009), leverages the sensation (sense) of
26 immersion afforded by *Second Life* through the use of avatars, communication tools and a 3D
27 environment. Through scaffolding, they found that collaborative learning in a virtual world
28 became more effective. Communication tools provide a range of collaboration opportunities
29 within virtual worlds (Minocha & Roberts, 2008). There are opportunities for open-ended
30 problem solving activities, which allow the creation of experiences and learning activities
31 which could not otherwise take place in the real world (Good, Howland & Thackray, 2008)
32 and provide opportunities for experimentation without real-world repercussions (Dede,
33 1995).
34

35 However a substantial number of virtual world learning experiences reported in the literature
36 continue to replicate pre-existing, 'real-life' learning experiences, such as replicating lecture
37 theatres for co-located or distance learners to attend lectures (de Lucia, Francese, Passero &
38 Tortora, 2009). While there may be benefits to distance learners attending a shared lecture
39 experience, this can already be achieved effectively through technologies such as webinars
40 and webcasting.
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42 As early adopters recreate what has gone before in new technologies (Winn, 2005), there is a
43 need to move beyond what a technology can replace and consider the unique characteristics
44 and potential for learning that the technology can offer. Therefore, we posit that to make this
45 move with learning in virtual worlds there is a need to consider the perceived educational
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affordances of virtual worlds and identify pedagogies that leverage the range and unique combination of these affordances.

1.2 Affordances

Within the literature on virtual worlds, 'affordance' is a term often used but seldom defined. As a result, research in this area runs the risk of listing and discussing affordances without defining what is understood by the term. Used to describe other technologies, various definitions of 'affordance' are offered, resulting in confusion. Oliver (2005) describes the existence of multiple and differing definitions as devaluing the term. However, the prevalence of this concept and the confusion surrounding it places a requirement on researchers to clearly describe their understanding of 'affordances' in their work.

Gibson (1979) originally described affordances as relationships between what an environment offers or provides for an organism. These relationships are not learnt and can be both positive and negative. Norman (1999) went on to appropriate this term within the sphere of design, introducing a perception-action coupling where the relationship between the perceived affordance of an object and the actions of the organism may need to be learned. Following this shift, varying definitions have emerged. Kirschner (2002) specifically defined educational affordances of a technology as the "characteristics of an artefact that determine if and how a particular learning behaviour could possibly be enacted within a given context" (p.19). Norman (1999) describes the user's 'perceived affordances' of a technology as more important to the designer while there may be an additional 'real' set of affordances. This suggests that the perceived affordances may vary across users. For educational purposes it may not be necessary to identify all possible affordances of a technology, rather it is the combination of these in an educational setting that give rise to the educational affordances perceived by the individual. This outlines our working understanding of 'perceived educational affordances'.

Dickey (2003) provides one of the earliest analyses of pedagogical affordances of virtual worlds, based on the *Active Worlds* platform. Specific tools within the virtual world, such as communication and movement, are analysed for the perceived educational affordances that emerge through implementation of a constructivist learning activity.

This study focuses on the use of the virtual world *Second Life*, due to its wide uptake and availability for educators, the increasing research literature and wide range of features available. The 3D representation of avatars and environment in which the avatars can move and interact with each other through communication tools affords a sense of self and presence which may result in immersion and support socialisation and collaborative learning (Kemp & Livingstone, 2006; Cross, O'Driscoll & Trondsen, 2007; Minocha & Roberts, 2008). Virtual worlds such as *Second Life* which provide tools that afford the construction of objects and environments (Delwiche, 2006) are also persistent (Castronova, 2005) and flexible.

1.3 Pedagogy

1 Evidence from the literature discussed in section 1.2, such as Jamaludin et al. (2009) and
2 Dickey (2003), suggests that virtual worlds appear to be most suitable for broadly
3 Constructivist learning. However Constructivism encompasses a wide range of theoretical
4 approaches to learning. As described above, we believe it is necessary to consider the
5 perceived educational affordances of virtual worlds in order to identify appropriate
6 pedagogies to inform the design of effective learning experiences.
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9 Constructionism, requiring the building and rebuilding of explicit objects (Papert, 1980),
10 appears to be an obvious pedagogy for use in virtual worlds which have tools that afford the
11 building of objects in a flexible and persistent environment. While the build and rebuild
12 opportunities may be infinite within *Second Life*, a lack of structure may lead to a ‘tyranny of
13 freedom’ (Schwartz, 2000). There is also little consideration of the role that an avatar and
14 communication tools may play within the theory.
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18 In order to leverage the combination of communication tools, sense of immersion and
19 opportunities for collaboration described above, Social Constructivist pedagogies seem most
20 appropriate. Of these, two pedagogies which could also explicitly leverage the building tools
21 and persistence of *Second Life* are considered: Knowledge Building and Communal
22 Constructivism, both considered by their respective authors to provide a new pedagogical
23 approach for the use of technology in education (Scardamalia & Bereiter, 1994; Holmes, et
24 al., 2001).
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28 Knowledge Building is based on the use of authentic problems, self-organisation, monitoring
29 and correction, collective responsibility, discourse and the creation of artefacts to advance the
30 collective knowledge, viewing individual learning as a by-product of the process
31 (Scardamalia, 2002; Scardamalia and Bereiter, 2003; Scardamalia and Bereiter, 2006). While
32 there is freedom to pursue individual lines of enquiry, there is also structure, thus avoiding
33 the tyranny of freedom previously discussed. The focus is on the process of community
34 knowledge creation. Individuals contribute by questioning, researching and working with
35 others to build community knowledge. At the end of the Knowledge Building process the
36 community creates a final artefact to represent the advancement of the community
37 knowledge.
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41 Communal Constructivism (Holmes et al, 2001) closely resembles the underlying processes
42 of Knowledge Building and extends it with not only a focus on constructing knowledge for
43 current learners but future learners as well. Learning artefacts created by one group of
44 learners are fed back into subsequent iterations of the learning task, emphasising the use of
45 past learners and their artefacts to influence the learning experience of future learners. New
46 groups of learners are then able to take part in the same activities, which provide context to
47 the artefacts left by previous groups, and leverage the artefacts to extend their own
48 knowledge.
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52 The features of both Knowledge Building and Communal Constructivism provide
53 opportunity to leverage the range of affordances of *Second Life* outlined above. However the
54 extension provided by Communal Constructivism, whereby groups of learners create learning
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1 artefacts for themselves as well as others, relies on the persistent and flexible nature of virtual
2 worlds. This understanding leads us to consider Communal Constructivism as an appropriate
3 pedagogical approach to explore within virtual worlds.

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5 To examine this hypothesis it is necessary to design a learning experience, implement it with
6 learners and evaluate both the learner's experience and the pedagogy in action. To evaluate
7 both the outcomes and operation of the pedagogy in action the following questions are posed:
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- 11 • To what extent did the features of Communal Constructivism emerge through
12 subsequent groups' participation in the learning experience?
 - 13 • What were the learner's perceptions?
 - 14 • Did learning occur?
- 15

16 **2. Method**

17 *2.1 Participants and approach*

18
19 Case studies provide an opportunity for in depth exploration of a specific learning activity in
20 action. Adopting a multiple-case study approach, an opportunistic sample of twenty
21 educators from around the world, with experience of *Second Life*, took part in the learning
22 experience. Five groups were formed with each group completing the learning experience
23 and taking part in a semi-structured interview before the next group began.
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27 Despite using a multiple-case study approach, the intention is not to enable generalisation
28 between cases as suggested by Creswell's (2007) description of multiple case studies. Within
29 a Communal Constructivist learning activity, as each new group of learners create a learning
30 artefact which is left in the environment for subsequent groups to use, the learners are
31 changing the learning experience, thus creating a new case. This is an anticipated outcome of
32 Communal Constructivism and therefore a multiple-case study approach is appropriate to
33 explore this phenomenon.
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36 *2.2 Research design and procedures*

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38 Prior to taking part in the learning experience informed consent was collected from
39 participants. In-world text documents were provided to learners outlining the purpose of the
40 research and their right to withdraw. Following data collection avatar names and other
41 potential identifiers were removed through an anonymisation process.
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45 Each group took part in the learning activity for four hours over the course of two days (two
46 hours each day), except for the fifth group who received an additional 2 hours on a third day
47 which is discussed below. Data collection took place in *Second Life* both during and
48 following the learning experience. During the learning experience the chat logs of the
49 learners' text based conversations were recorded along with the researcher's own
50 observations. Semi-structured interviews took place in *Second Life* through text-based chat
51 tools following the learning experience. Finally, the five learning artefacts created by the
52 groups were collected for analysis.
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2.3 Activity design

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2 The learning experience was designed to provide opportunity for the features of Communal
3 Constructivism to be present by leveraging the perceived educational affordances of *Second*
4 *Life*. Through an analysis of the seminal work of Holmes et al. (2001) and subsequent
5 literature (for example Poutney & Aspden, 2002), six core features of Communal
6 Constructivist pedagogy were identified: interaction with the environment to construct
7 knowledge; active collaboration; engagement in knowledge construction; publishing of
8 knowledge; transfer of knowledge between groups; and a dynamic and adaptive course. The
9 3D representation of avatars and environment and communication tools afford a sense of
10 presence, immersion, socialisation and collaborative learning. These affordances were
11 leveraged to support interaction with the environment, active collaboration and knowledge
12 construction within the group. The building tools of *Second Life* allow learners to publish the
13 knowledge constructed by the group and the persistent nature of virtual worlds provides
14 opportunity for transfer of knowledge to take place between groups. The flexible and
15 persistent nature of virtual worlds combined with infinite build and rebuild opportunities in
16 *Second Life* allows activities to be dynamic and adaptive both through the actions of learners
17 and teachers.

24
25 The learning experience was integrated as part of a wider island milieu, *Murias*, in *Second*
26 *Life*. *Murias* is an immersive environment for the training of educators within the field of
27 Development Education (Authors, 2009), funded by Irish Aid (Department of Foreign
28 Affairs, Ireland). Development Education explores issues such as development, human
29 rights, justice and world citizenship, aiming to change views and opinions. The aim of the
30 learning experience was for adult learners to develop an understanding of the issues around
31 North-South Interdependence using the banana trade to exemplify these issues and to provide
32 a growing resource on the island.

36
37 A discrete learning environment was constructed on a flat map of the world (shown in Fig 1).
38 As learners' avatars moved across the map, sensors would trigger the passing of location
39 specific information to learners through learning objects (such as images and text notecards)
40 and using the local chat communication tools. Objects were also placed on and around the
41 map and if learners chose to interact with these they would be given related learning objects.

45
46 Fig 1. Learning environment in *Second Life*.

47
48 To scaffold the learning experience an adapted WebQuest (Dodge, 1995) model was used
49 including an evaluation rubric. Instead of being directed to different websites, learners were
50 encouraged to move around, exploring the map and interacting with objects to find
51 information. The task remained the same between groups: To create a book in *Second Life*,
52 containing text and images, to explain the groups' understanding of North-South
53 Interdependence to future groups of learners. The process encouraged learners to interact
54 with the environment and each other, providing discussion prompts. After completion of the
55 activity a copy of the group's book, their learning artefact, remained on the platform for
56 future groups of learners to use (Fig 2.). While voice based communication was available in
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Second Life at the time of the study not all participants in each group had access to suitable equipment, thus all communication between learners took place via the text based chat system, ensuring all conversations between participants could be recorded.

Fig 2. Books created by each group remain on the platform for future learners to use.

2.4 Data analysis

In order to examine Communal Constructivism in action within a learning experience in *Second Life* there were three phases of analysis to answer the three research questions:

- To what extent did the features of Communal Constructivism emerge through subsequent groups' participation in the learning experience?
- What were the learner's perceptions?
- Did learning occur?

2.4.1 Features of Communal Constructivism

While the features of Communal Constructivism identified above were designed for in the learning experience, it could not be presumed that they would be evident as learners took part in the activity. A rubric was constructed listing the six core features of Communal Constructivism identified in the literature: interaction with the environment; active collaboration; engagement in knowledge construction; publishing of knowledge; transfer of knowledge between groups; and a dynamic and adaptive course. Interaction was subdivided into interaction with other group members and interaction with the surrounding environment.

As this question focuses on the activity during the learning experience, the chat logs, researcher observations and the completed artefacts were analysed for evidence of each of the features in the rubric on a group by group basis provide triangulation to demonstrate concurrent validity (Cohen, Manion and Morrison, 2007). After an initial review of the data it was decided to split the 'transfer of knowledge between groups' feature into whether the groups looked at past groups' books and whether there was evidence of them building upon these. This decision was taken as the researcher saw early indications that the first may occur but not the latter (see Table 1).

2.4.2 Learners' perceptions

Within social constructivist case studies the views and opinions of research participants should inform results. This was achieved through content analysis of the semi-structured interviews of each group. This began with immersion in the data and identifying *in vivo* codes which were reduced and collapsed over several iterations into emerging themes (Creswell, 2007).

2.4.3 Evidence of learning

Although each group of learners took part in the learning activity and completed a learning artefact to represent their knowledge this does not provide evidence of learning. To inform our understanding of whether learning took place all the data sets were explored for evidence

of learning. Particular attention was paid to the responses of learners in the semi-structured interviews and analysis of the features of Communal Constructivism, the created artefacts and the evaluation rubric.

3. Results

The study aimed to explore Communal Constructivism as a pedagogy for use in virtual worlds as participant groups took part in a specifically designed learning experience in *Second Life*. The data collected during and following each group's participation was analysed to answer the specific research questions.

3.1 Features of Communal Constructivism

The initial phase of analysis carefully examined the chat logs, researcher observations and completed artefacts for evidence of the six core features of Communal Constructivism through the use of a rubric.

Table 1

Communal Constructivist features as found among groups

	Communal Constructivist Feature	Group				
		1	2	3	4	5
1	Interaction with the environment to construct knowledge					
1.1	Interaction between group members	✓	✓	✓	✓	✓
1.2	Interaction with learning objects	✓	✓	✓	✓	✓
2	Active engagement in knowledge construction	✓	✓	✓	✓	✓
3	Active collaboration	✓	✓	✓	✓	✓
4	Publishing of knowledge between groups	✓	✓	✓	✓	✓
5	Transfer of knowledge between groups					
5.1	Evidence of group viewing past groups' books	n/a	✓	✓	✓	✓
5.2	Evidence of group using book to build knowledge	n/a	-	-	✓	✓
6	Dynamic and adaptive course	✓	✓	✓	✓	✓

As shown in Table 1, there was evidence of the first group taking part in a Social Constructivist not Communal Constructivist learning experience. There were no pre-existing artefacts from previous groups of learners for this group to look at and use as part of their knowledge construction and so these features were not applicable to this group. Therefore the second group to take part in the activity presented the first opportunity for a group to build on the knowledge of past groups.

Analysis of the chat logs and observations found evidence of participants in both the second and third groups viewing the book(s) created by previous groups. However there was no evidence from the chat logs of learners referring to these books during group discussions and no evidence from the artefacts to suggest that there was any influence in the knowledge that was published.

The full features of Communal Constructivism first emerge with the fourth group. This was the first group which clearly presented evidence of participants using the knowledge from books created by past groups. The following excerpt shows an example of how this group used the published knowledge of previous groups to deepen their own understanding:

Excerpt 1:

- E: so let's stay focussed on bananas
- D: it's about the profit principle and the whole way of global economics
- F: My problem is that we are looking at interdependence
- E: yes F?
- F: from what I read in the books a concept that implies some equality in power
- J: yep, the interdependence
- F: I don't think I believe that describes the north south relationship
- D: the power belongs to the companies not the producers or the consumers
- J: k so how is the poor farmer bloke in nicuagrua/south america dependant on the housewife who shops at the dutch supermarket?

Similar evidence was found in the data collected in both chat logs and artefacts of the fifth group of participants. Although they were the final group, they requested adaptations to the activity through time extensions as they felt that the extent of the knowledge contained within the artefacts of previous groups required additional time to fully consider. As Communal Constructivist learning activities should be dynamic and adaptive an additional two hours on a third day was provided for this group to complete the activity.

3.2 Learners' perceptions

In order to analyse the learners' perceptions of the learning activity, the semi-structured interviews with each group were analysed using content analysis to code and theme. Themes emerging from individual groups included 'successful group', in which participants "came together" and "interacted" to produce work that was "more successful than in RL" (real life). 'Pressure' emerged in the *in vivo* codes of a number of groups, developing to into a major theme for the fourth group. Pressure was seen as both positive and negative and came from a number of sources. One participant found working as a part of a group "restraining" whilst others in the same group felt it reduced individual pressure and was supportive. Pressure for the fourth group also came from the publications of previous groups.

Following the content analysis of the individual groups' semi-structured interviews, the *in vivo* codes from each group were drawn together to explore themes which might emerge over the duration of the study. 'Time' emerged as a theme, becoming progressively more important over the duration of the study. None of the *in vivo* codes from the first group were

1 reduced into the theme of 'time', however with each subsequent group this theme became
2 more and more prevalent. Although 'time' emerged as a theme in the initial content analysis
3 of the fourth and fifth groups, it was initially found to emerge strongly from group three. As
4 this theme grew, so did the suggested time for the activity from participants, from two
5 additional hours, suggested by participants of the third case, to eight, suggested by the fifth
6 case.
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9 'Group dynamics' emerged as a theme through the two analyses resulting in strong 'internal'
10 and 'external' themes. 'Internal group dynamics' emerged as a theme across all groups with
11 little variation. This theme and its underlying codes demonstrate that individual participants
12 valued the interactions within the groups for a variety of reasons with *in vivo* codes such as
13 "discussion", "cohesion", "support", "creation" and "learning". Groups were "created
14 through discussion" and through the discussions "knowledge and group identity emerged",
15 with participants learning from as well as with each other. As with the theme of 'time',
16 'external group dynamics' only began to emerge in the semi-structured interview of group
17 three and became stronger with each subsequent group. The artefacts of past groups were
18 described as both intimidating and helpful to current groups, who recognised the importance
19 of passing on knowledge to future groups. There was also a desire by some to "better" the
20 work of previous groups.
21

22 The 'environment' in which the learning activity took place was an important theme across
23 groups, relating to specific features of the learning environment created for the study rather
24 than specific features of *Second Life*. The environment was described as "very visual", with
25 the flat map of the world which learners walked across providing a "sense of space", resulting
26 in "travelling to explore". Participants described an "interactive" experience and a feeling of
27 immersion.
28

29 3.3 Evidence of learning

30 To identify evidence of learning all data sets and results of the previous two analyses were
31 explored. Through analysis of the features of Communal Constructivism and created
32 artefacts, each case showed evidence of actively engaging in knowledge construction. The
33 semi-structured interviews demonstrated that a group understanding of the topic developed
34 through their discussions whereby they learnt from, as well as with each other.
35

36 Excerpt 2

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39 C: it was pretty good that we had such an in depth discussion yesterday on a
40 controversial subject
41

42 C: higher level skills are so important too
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44 A: Let the databases hold the content
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46 C: exactlym know how to find, critique, analyse and create
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48 C: Let us enjoy thinking
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A: share, negotiate and so on

In addition the interviews recorded many instances of participants reporting that they had “enjoyed learning” about the content. While this is not direct evidence of learning, it does demonstrate engagement at the group level

Although all participants were experienced users of *Second Life*, some individuals described a need to learn new skills in the virtual world in order to complete the task. While some viewed this as interesting and enhancing skills, some found it lead to frustration.

Excerpt 3:

E: I love having learned how to do all that in the course of this

J: yes well done matey

F: It's contrary to common practise to see learning as a group activity

D: best way to learn SL skills i find

D: the best constructivist learning iv'e seen is in sl

E: it is very difficult, agreed

The group artefacts were reviewed in relation to the evaluation rubric provided at the start of the activity. There was evidence from the artefacts created by the fourth and fifth group of a development of the activity beyond what had been accomplished by previous groups. While the first three groups focused on the banana trade (the stimulus provided by the learning environment), the fourth group focused on the social and environmental impacts of international trade in general with some reference to the banana trade. The fifth group focused on sustainability and education in an interdependent world adding at the end what they viewed as “The obligatory banana references”.

4. Discussion

The aim of this study was to explore Communal Constructivism as a pedagogy for use in virtual worlds. Five groups of participants took part in a specifically designed learning experience in *Second Life*, to develop their understanding of North-South interdependence. The learning experience was designed to leverage the affordances of the virtual world to provide opportunity for the features of Communal Constructivism to emerge. Although designed to meet the requirements of Communal Constructivist pedagogy, it could not be presumed that these features would emerge during the learning experience. Analysis of chat logs, artefacts and observations showed that the first group to take part in the learning activity experienced social constructivist learning, lacking any previous groups’ artefacts to build on. There was evidence of the features of Communal Constructivism emerging through subsequent groups’ participation in the learning experience. Due to the persistent nature of *Second Life* subsequent groups had access to the artefacts of previous groups. Despite this, evidence of learners using these artefacts only emerged in the chat logs and artefacts of the

1 fourth and fifth groups to take part in the activity. At the same time, these were the first
2 groups to request substantial time extensions, which emerged in the content analysis of the
3 semi-structured interviews. The fourth group was also the first to mention what they viewed
4 as the importance of passing on knowledge to future groups during the semi-structured
5 interviews which reduced into the theme 'external group dynamics'. Similar results on the
6 number of artefacts and required time have not previously emerged in literature concerning
7 the use of Communal Constructivism. This suggests that there may be a need for in-depth
8 analysis on the influence of published artefacts on subsequent groups. There are a number of
9 possible reasons for the results obtained, for example: for the second and third groups to
10 have shown evidence of using the previously published artefacts additional time may have
11 been required; for all groups additional time was required to read the artefacts in addition to
12 the information that was already available in the learning experience. However the additional
13 time suggested by the fourth and fifth groups (6 and 8 hours respectively) suggests that due to
14 the adaptive nature of Communal Constructivism, each additional artefact added to the
15 learning environment requires additional time, not just to be read but also to assimilate and
16 build upon the presented knowledge.
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23 Learners' perceptions of the learning activity focused on the interactions with other learners
24 and the learning environment, as well as time constraints and pressure. Pressure was
25 perceived to come from others within the group, expectations of the learning task, the
26 published knowledge of previous groups and time. These pressures helped to "focus" the
27 actions of the learners and encouraged them to "better" the knowledge of previous groups
28 through consideration of the published knowledge in their own discussions. As suggested by
29 Jamaludin et al. (2009), learners found the scaffold provided by the WebQuest supported
30 collaboration. Collaboration occurred through interaction between learners, who also
31 interacted with the learning environment, through the tools of the interface which provided
32 supports rather than barriers to learning.
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38 During the semi-structured interviews there was some discussion as to whether this learning
39 experience could be replicated through other technologies. While suggestions such as wikis
40 and VLEs were made, they were quickly dismissed as lacking many of the elements found in
41 the learning experience such as the sense of immersion facilitated through travelling across
42 the map. Wikis were considered for collaboratively constructing a final product, however
43 they lack the synchronous communication and immersion. Overall it was suggested that
44 whilst the learning experience could be recreated outside of the MUVE, the impact of the
45 experience would be lost and feel contrived.
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50 Evidence of learning was found for each group through the analysis of the features of
51 Communal Constructivism rubric, chat logs, artefacts and semi-structured interviews. As
52 may be expected from a Communal Constructivist learning activity, knowledge developed
53 through interactions between members of the individual groups, which took the form of
54 discussions scaffolded by the WebQuest. There was also evidence of groups learning from
55 the artefacts published by previous groups and developing this knowledge. Communal
56 Constructivism leverages the view of a top-down community of learners, focusing on the
57 learning that takes place within the group as a whole. While the learning experience was
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1 shown to be successful for group learning, it is interesting to note that for two participants
2 there was no evidence to suggest that they had constructed knowledge at an individual level.
3 This would suggest that while Communal Constructivist learning within a virtual world can
4 successfully facilitate learning at a group level, this cannot be presumed to be the case at an
5 individual level.
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7 Communal Constructivism was selected for this study based on the alignment of the features
8 of the pedagogy and the affordances of *Second Life*. The results suggest that the features of
9 Communal Constructivism did emerge during the study, leveraging the affordances of the
10 virtual world. Learners described being immersed not only in the virtual world but also in the
11 activity, they used communication tools to interact with each other and collaborate, and the
12 combination of persistence and building to create knowledge artefacts that could be left
13 within the original learning environment for future groups. While a wide range of
14 affordances were leveraged, some could be seen to be leveraged to a greater extent than
15 others. For example while learners created learning artefacts, afforded by the building tools,
16 there was little opportunity in the task for them to leverage the infinite build and rebuild
17 opportunities available in the environment.
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23 **5. Conclusion**

24 This paper has explored the use of Communal Constructivism as the pedagogical
25 underpinning for the design of a learning experience within a virtual world, *Second Life*.
26 Five groups of learners took part in the learning experience which leveraged a range of
27 affordances to provide opportunity for the features of the pedagogy to emerge. Analysis of
28 each group's chat logs, learning artefacts, semi-structured interviews as well as researcher
29 observations found that for each group there was evidence of learning. The results suggest
30 that building on the knowledge of previous groups may be related to the time available for
31 tasks as well as the number and possibly quality of knowledge artefacts created by previous
32 groups. Previous research does not suggest this as a possible outcome of Communal
33 Constructivist learning activities, however we speculate this result is not unique to the use of
34 virtual worlds combined with this pedagogy. In depth analysis of this issue may be necessary
35 across technologies to better understand this aspect of Communal Constructivism.
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43 While successful in this study, we do not suggest that Communal Constructivism is the only
44 appropriate pedagogy for use in virtual worlds. Rather the features of the pedagogy are able
45 to leverage a wide range of the affordances of *Second Life*, avoiding replication and using the
46 wide range of features of the technology. Further research is required to explore other
47 pedagogies for use in virtual worlds. We suggest that the initial identification of these
48 pedagogies should be based on the combination of perceived educational affordances
49 available in the virtual world.
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54 **Acknowledgements**

55 **References**

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