

***Second Life*: Harnessing Virtual World Technology to Enhance Student Engagement and Learning**

Yvonne Masters

School of Education, University of New England, Armidale

Sue Gregory

School of Education and DEHub, University of New England, Armidale

Abstract

Technology is often used in higher education to deliver a range of online materials to students. Most commonly this online delivery occurs through learning management systems such as *Blackboard*, *Moodle* and *Sakai*. However, with the emergence of virtual worlds there is an opportunity to harness this technology to enhance student engagement and learning in new and innovative ways. Outlined in this paper is an examination of how *Second Life* has been used in three pilot studies at the University of New England and argues that there are effective gains to be made in the future by using this medium for learning and teaching, particularly for off-campus students.

Keywords: *Second Life*, virtual worlds, teaching and learning, student engagement

Introduction

Virtual worlds

In 2010 technology permeates all sectors of education from early childhood, through primary and secondary schooling and into higher education. In this last sector, most universities have online components to their subjects, including on-campus subjects, and, for off-campus students, online delivery of material is now the norm. Students are required to use Web 2.0 tools such as blogs, wikis, chat rooms and discussion boards, usually through a learning management system (LMS) such as *Moodle*, *Sakai* or *Blackboard*, allowing interaction with each other and academics. This interaction is commonly asynchronous and limited in scope. However, these tools have moved some way to bridging the isolation of the paper-based delivery of material to individual students studying at home with little or no interaction. But can we do better yet? An exciting possibility for extending learning and teaching strategies and enhancing student engagement lies in the use of virtual worlds as learning spaces.

Over recent years, virtual worlds have been increasingly used as an effective means of building social networks and communities of learning (Boulos, 2007). Due to the availability of synchronous communication, virtual worlds provide enhanced interactivity (Petraou, 2010) that allows for immediate, contextualised feedback as well as permitting asynchronous interaction. This flexibility can support and enhance solo learning, student-student interaction and academic-student interaction (Petraou, 2010).

Student engagement

Engagement in study is imperative because when students are engaged with what they are learning they “have a sense of energetic and effective connection with the activities they are undertaking” (Schaufeli, Bakker, & Salanova, 2006, p.702). This connection can be vital in improving student

outcomes. Engagement has been referred to in the research literature as an amalgam of three facets: behavioural, emotional and cognitive engagement (Fredricks, Blumenfeld, & Paris, 2004). These three dimensions of engagement are inter-related and, when present together in an individual student, can help to improve learning outcomes. Hu and Kuhl (2002, p.572) report that the “most promising approach to encouraging higher levels of student engagement ... is to change the perceptions that students have of certain aspects of the institutional environment”. For off-campus students one of the aspects of the institutional environment that can be changed to advantage them is their sense of belonging to a learning community. Belonging is an integral aspect of emotional engagement and therefore needs to be enhanced. The authors of this paper contend that the use of virtual worlds can promote “active student engagement in authentic learning activities designed to achieve desired learning outcomes” (Gregory & Lloyd, 2010).

Paving the way

With an exponential growth in virtual worlds, where new worlds “spring up daily, it seems” (Kelton, 2008, p.16), we cannot afford to neglect the potential of these worlds for education. *Second Life* is emerging as the virtual world of choice in this area (Warburton, 2009). Cummings (2010) states there are approximately 750 educational institutions operating their own islands in *Second Life* and this does not include smaller parcels of land. It seems unlikely that virtual worlds are going to go away and as a tool for teaching and learning they have shown “the same growth pattern and potential as the Internet” (Kelton, 2008, p.22). With this wave of innovation in technology teaching and learning sweeping the world it is vital that Australia not lag behind. Educators will need to consider the use of virtual worlds, thus extending their teaching repertoire, and “help to claim these spaces for social and educational purposes” (Schutt & Martino, 2008, p.900).

Since 2008 three case studies have been conducted with teacher education students, both on- and off-campus, at the University of New England (UNE) in order to explore the viability and effectiveness of *Second Life* as a learning and teaching environment. The emphasis of the studies has been primarily to test virtual worlds as teaching and learning spaces by creating a learning environment for off-campus students because the use of virtual worlds “may afford pedagogical support for fostering constructivist learning environments for geographically distant learners” (Dickey, 2003, p.105). A further aim of the second project was to explore whether academics who were novice users of virtual worlds could quickly develop the requisite skills for effective teaching in-world.

All three case studies are reported in the next section, with greater discussion of the third case study. The first two studies have been more fully reported elsewhere (Gregory & Tynan, 2009; Gregory & Masters, 2010). The three case studies received university Ethics approval.

Outline of the case studies

Case Study 1: *Second Life* as an engaging and effective learning environment

The first study was undertaken by a lecturer in Information Communication Technology (ICT) in the School of Education, Sue Gregory. The project had twelve participants who elected to take part as one of their assessment tasks. Students self-selected to take part. The aim of the research was to explore the potential of virtual worlds in higher education institutions to engage students in deeper thinking and greater collaboration.

To enable her teaching to be effective, Gregory had created her avatar, a virtual persona, called Jass Easterman, twelve months before data collection began and had honed her skills in the use of *Second Life*. A purpose built meeting place, Education Online Headquarters, was created to provide

students with a stable learning environment that could give them a sense of permanence and as an area where the students could meet informally, outside of 'class' time.

Each week, for a two-hour tutorial period, participants met in *Second Life*. The first hour the meeting was held at Education Online Headquarters to consider issues they were having with their learning and the focus topics for the week were discussed. In the second hour, students visited a range of virtual national and international institutions where they were given tours of the facilities and the virtual guest academic discussed how they were using this environment with their own students.

Data (both quantitative and qualitative) were collected through various formats: surveys, recording of online dialogue (communicating in *Second Life* was conducted via text through a designated chat room to avoid potential bandwidth and hardware problems of audio) and questioning. A pre-semester survey was designed to discover students' existing computer expertise and also to ascertain prior knowledge of Web 2.0 tools and virtual worlds. The post-semester survey explored both the development of knowledge and expertise as well as the perceptions of the students regarding the efficacy and effectiveness of using a virtual world such as *Second Life* for educational purposes.

The survey responses revealed that students who were not familiar with Web 2.0 technology at the start of their experience in *Second Life* had, by the end of the semester, not only understanding of the technology, but also of how to use a virtual world for a variety of educational purposes. Overall, students reported that the *Second Life* activities supported their learning with 71.45% reporting 'quite a lot' and 28.58% a 'fair amount'. These were the top two categories. All students received a grade of 80% or higher for the virtual world component of their study but it was also recognised that "these students may have been dedicated and motivated learners in any situation and it may not have mattered what they were studying to receive these high grades" (Gregory & Tynan, 2009, pp.382-383).

The main result of this research project was that the data supported the contention that a virtual world is an effective teaching and learning environment in terms of engaging education students and equipping them with the necessary skills and knowledge to use the environment in their own teaching (Gregory & Tynan, 2010).

Case Study 2: A comparison of face-to-face and *Second Life* workshops

After completing the previous project with postgraduate students, Gregory approached another academic, Yvonne Masters, to collaborate on a further case study. The aim was to investigate whether traditional teaching could be replicated, or possibly enhanced, by using a virtual world such as *Second Life* as a learning environment for students. Because the researchers were uncertain whether novice *Second Life* users, both student and academic, might require high levels of technical assistance they chose to trial the first iteration of this study with on-campus students in a computer laboratory. This face-to-face delivery would help to address any technical problems as they occurred.

To assist the project, Gregory created a virtual classroom and playground in *Second Life* to be used across all levels of education from Kindergarten to Higher Education. Both the classroom and playground have the capacity for interaction not only with other students, but also with books, play equipment and other educational resources. The entire virtual school environment was developed with a wide range of resources to enable academics to use it with their students as if they were in a real classroom or playground. There was capacity for extending the environment (as later happened for the third case study) as further educational uses emerged.

Traditional face-to-face workshops were conducted and then repeat sessions occurred in *Second Life* to allow effective comparisons to be made between the two environments. The decision was made

by the researchers to use de Bono's (1985) six thinking hats strategy as the focus learning event to permit easy replication in *Second Life*. It was also chosen because this strategy is an integral component of the first year primary education course. All first year students took part in the workshops.

The authors were both present for the face-to-face workshops and then in *Second Life*, in the latter case as their avatars, named Jass Easterman (created in 2007) and Tamsyn Lexenstar (created in 2009). Both researchers are experienced educators in the 'real' world, each with over twenty years teaching experience. At this stage, Jass had been teaching in *Second Life* for over two years while Tamsyn was new to teaching in a virtual world. In the real life workshops Masters (Tamsyn) conducted the teaching while Gregory (Jass) had the role of observer. With the *Second Life* workshops Jass' role was purely observational and to provide troubleshooting if required. Tamsyn did the teaching. To aid Tamsyn's use of the environment, Jass provided her with a few orientation sessions and also gave a preliminary lecture to students to teach them how to use *Second Life*.

Students were observed during their participation in both the real and the *Second Life* workshops and all online dialogue (which took the form of typed chat) was recorded for analysis. At the end of each workshop the students, Masters and observers (Gregory and another academic) all completed a survey that had been designed to collect data about their perceptions of engagement (affective, behavioural and cognitive). Data was recorded on a 5 point Likert Scale with a section for further comments.

The results indicated that students had similar perceptions of both forms of teaching, although there were students who didn't enjoy the opportunity of participating in a virtual world workshop, as indicated by one student stating, "Too hard to understand and use. Too distracting". Another student summed up their experiences, "I thought it was good. Once the hype slowed down, we had some good points. It was engaging and constant, meaning the interaction levels were high. I liked it. I think it could work well, so long as it was scaffolded effectively. Students need to know the point of what they are doing" (Gregory & Masters, 2010, p.11). Masters, who conducted both the real life and *Second Life* sessions, found that she improved in her ability to teach in the virtual world with each subsequent workshop (Gregory & Masters, 2010). This gave credence to the authors' belief that *Second Life* would provide a learning environment that was relatively user-friendly.

Based on the results of this case study trial, amendments to the method of workshop delivery were planned for 2010 with the project being extended to both on and off-campus students, permitting a comparison not only between real life and *Second Life* workshops for on-campus students, but also comparison between perceptions of *Second Life* across the two modes of study.

Case Study 3: A comparison of online discussion tools and *Second Life* for learning

The third project, currently in progress, is the next, but not last step in the journey of our research into the effectiveness of *Second Life* as a learning environment. It complements the second case study described in the previous section and, while specifically aimed at exploring both the perceptions of off-campus students regarding modes of online interaction and also the assessment performance of these students compared to the rest of the cohort, both on and off-campus students participated. The ability to compare responses from both cohorts of students could provide richer data for comparison of online discussion via the tools in the LMS (both *Blackboard* and *Sakai*) and via *Second Life*.

Students from seven education subjects were invited to participate in this pilot project. Students were all self-selecting to study in this mode on the basis of interest in using another learning environment. The aim of the research project is to explore whether student interaction in a virtual world has a greater impact on learning, as evidenced in the quality of assessment work, than the

interaction available through tools in the LMS such as chat room and/or discussion boards. It compares student perceptions of the use of online tools in the LMS and in *Second Life* as assets to the learning that they are required to do in order to complete assessment tasks. Our contention is that the enhanced interaction capabilities of *Second Life*, not only peer-to-peer but also student-academic, are reflected in assessment scores. The on-campus students, who have face-to-face tutorials provided a point of comparison regarding this method of interaction.

Across the university's two LMSs (*Blackboard* and *Sakai*) a range of online tools are available such as discussion boards, chat rooms, blogs and wikis. Predominantly, discussion boards and chat rooms are used for group interaction, although the use of blogs and wikis is growing. Which tools are used depends largely on the subject that students are studying and on the preference of the academic who sets up the interactions.

A major difference between the online interaction using the LMS discussion board and that in *Second Life* lies in the nature of that interaction. Interaction via the discussion board is almost always asynchronous and both students and academics are generally responding to one or more posts placed on the board by individual students. The interactions tend to be task-related rather than social and the academic more frequently responds only to specific questions rather than commenting on student-student discussion, and often expects students to read all of the discussion board for responses rather than responding to individuals about the same question, as evidenced by both student discussion of other subjects being studied and also from observation of other subject interactions. In contrast, interaction in *Second Life* is typically synchronous, occurring at a time agreed by all involved, usually, but not always, of an evening, and the discussion is both social and task-related, more closely replicating discussions that occur in face-to-face workshops.

Chat rooms permit synchronous discussions but are generally not used for teaching purposes by most academics. The chat rooms established are often there for students to interact socially and are rarely, or never, visited by academics for discussion purposes. When they are used for teaching, they are purely text-based with no visual presence other than the written name of the person who has typed each message. There is also no capacity for individuals to know whether another person is making a comment until the text appears. This can make discussion difficult due to the comments appearing in an unstructured manner. In contrast, in *Second Life* there is the visual presence of each person's avatar situated within a virtual learning space and it is possible to observe, via the typing actions of individual avatars, whether contributions are being made to the discussion. This is similar to the visual cues which provide feedback regarding the rules of participation in real-life workshops.

This study is still in its infancy. Data have been collected from students in first semester subjects and more data will be collected in second semester. The analysis of the preliminary data has commenced and the initial assessment comparisons look promising (see Tables 1 and 4). The collection of both quantitative and qualitative data is occurring through the recording of all online postings in both the LMS and in *Second Life* and also via end of semester surveys to ascertain student perceptions of their engagement and learning through whichever medium they used for interaction. The surveys also provided background data such as student age, home location and computer expertise. From this data a profile has been developed regarding students and their demography (see Table 2).

A major aim of this third study is to gather data that could provide insights into whether student learning is enhanced by the use of virtual worlds with results on assessment tasks in their subject of study being used as one measure of this. While analysis of results is still in the preliminary phase, the emergent indication is that there could be justification for this claim.

In one of the first semester subjects there was both an on- and off-campus cohort. Twenty of the off-campus students elected to form two groups who would meet in *Second Life* to discuss their required readings and also their assessment tasks which included group reading responses, the

development of an ePortfolio and an individual reading response. They worked in the newly created staffroom with Tamsyn. Tamsyn, as her real-world persona, Masters, also had three tutorial groups who worked only on the LMS discussion board and chat room. Masters had groups in both environments in order to compare results across the environments with the possible skew of a different tutor being removed.

Based on the final results of all students (rather than task by task) the two groups in *Second Life* performed significantly better than the three using *Blackboard* and also significantly better than the whole cohort in that particular subject of study (see Table 1). As this particular subject is a first year subject of study it is not possible to ascertain whether the students who self-selected for *Second Life* were more 'gifted' students as there was no prior Grade Point Average for the majority of these students.

Table 1 Final results of students in Masters' groups compared with total cohort in subject

Result	Masters' Blackboard n=30	Masters' Second Life n=20	Total Cohort less Second Life n=334	Total Cohort n=354
High Distinction	0%	17%	0.2%	1%
Distinction	46%	72%	47%	48%
Credit	46%	11%	37.8%	36%
Pass	8%	0%	6%	6%
Failed/Failed Incomplete	0%	0%	9%	9%

In the combined results of all students (across the seven education subjects) who completed the end of semester surveys there were 74 students, which were broken down into the following categories of Age, Gender and Location of Residence. There were more females than males who completed the survey and most were located in locations with a population over 18 000. However, 20.3% of students live in locations of less than 5000 people. This indicates that location was not an issue for students and they were able to access the Internet regardless of their location, contrary to some beliefs. In relation to Age, 55.4% of the students were aged in the 25-44 age bracket, indicating the maturity of the cohort of students. A complete breakdown of this data can be found in Table 2 below.

Table 2 Student Age, Gender and Location of Residence

Age n=74		Gender n=74		Location of residence while studying n=74	
Under 18	0	Male	12	Rural - living on land/property	7
18 – 24	6	Female	62	Rural town - > 5000 people	8
25 – 34	26			Small regional town/city - 5000–18 000	11
35 – 44	27			Small non-regional town/city - 5000–18 000	1
45 – 54	14			Regional city - 18 000–50 000	20
55 and over	1			Non-regional city - 18 000–50 000	1
				Regional major city - 50 000–250 000	8
				Non-regional major city - 50 000–250 000	1
				Capital city	17

Synchronous discussions were available to students in the form of the LMS chat room and *Second Life*. Some students chose one of these tools, whilst many chose to use both as indicated in Table 3 below.

Table 3 Tools used for synchronous online discussions (n=59)

Learning Management System Chat Room	11	18.6%
<i>Second Life</i>	19	32.2%
Both	25	42.4%
Neither	4	6.8%

Table 4 below outlines student results of the full cohort who participated in *Second Life* sessions across all seven subjects (n=76) compared to all students who undertook the subjects involved in the project (n=600 total). Overall, many more students received High Distinctions in their end of semester results from the *Second Life* group than students who chose not to use this mode of learning (48.7% compared to 1.5%). The results clearly demonstrate that student grades were much higher for students participating in *Second Life* activities in contrast to those students who did not. There were no students who failed the subject who undertook the *Second Life* component to their study. These results are not definitive; however, they do indicate that those students who chose to participate in virtual world sessions have a much higher overall grade for their studies in those subjects. The large number of students receiving High Distinctions in the *Second Life* group could be because these are the more intelligent students. It could be because they are more engaged and motivated in their learning. Alternatively, it could be because when these students attend these sessions they become more motivated and desire to achieve higher grades because of the learning environment.

Table 4 Final results of *Second Life* students, all cohorts of students and all students including *Second Life* participants

Result	Average <i>Second Life</i> Student Results n=76	Total Cohort less <i>Second Life</i> n=524	Total Cohort n=600
High Distinction	48.7%	1.5%	7.50%
Distinction	38.2%	45.2%	44.33%
Credit	10.5%	36.1%	32.83%
Pass	2.6%	8.4%	7.67%
Failed/Failed/Incomplete	0%	8.8%	7.67%

Early indications reveal that students found their experience in *Second Life* both engaging and effective in enhancing their learning. However, there were also students reporting the same perceptions of chat rooms and discussion boards. The differences in perception often lay in the perception of 'being there' as opposed to other online tools as indicated by the following student

I enjoyed using Second Life more than on discussion or chat rooms. I like that you can see who is typing so that you are able to wait your turn to speak. I also liked the 'personal' contact of the avatars. The use of Second Life also provided the motivation and engagement we are all striving to attain for use with our students.

Discussion of three case studies

The suitable components of *Second Life* for education such as simulation, immersion and presence, to name but three, have been outlined by Warburton and Perez-Garcia (2009). These aspects of the *Second Life* experience can facilitate a variety of educational activities and, in so doing, they demonstrate “a rich picture of support for both distance and flexible education” (Warburton, 2009, p.421). As our research has progressed we have become more and more convinced of the effectiveness of the use of *Second Life* as a learning environment.

Second Life provides a virtual environment that can assist in creating communities of practice by bringing students, particularly those studying in the off-campus mode, closer to both their peers and academics. This finding was clearly demonstrated in the first pilot project where Gregory and Tynan (2009, p.384) report one student as saying:

I had a defining experience last week when we sat down in that open-air lecture space and I sat on one side and the rest of you sat on the other side. Suddenly I felt lonely and, without thinking, got up and moved to where you were all sitting. And then, I thought, that felt so real!

Student online dialogue and reflections reported that, even though they were mostly off-campus students, *Second Life* gave them the perception of being in a real, face-to-face discussion. Student feedback was that seeing another person’s avatar gave them the sense of the other person actually being there. Hewitt, Spencer, Mirliss, and Twal (2009) support the notion that virtual worlds can provide “engaging, learning-intensive alternatives to face-to-face scenario exercises” (p.5).

This capacity to feel engaged with a ‘real’ community was also an aspect of the data from the third pilot study. Comments from the survey reveal that presence and community are not only invoked by *Second Life*, but also are valued. Two examples serve to demonstrate:

Student 1: I cannot begin to describe how the use of *Second Life* has affected my learning. I no longer feel that I am studying by myself.

Student 2: The use of *Second Life* in both units was a great resource. It was more motivating to see the movement of the people (even though it was their avatars) but I felt like I was in the room with everybody. The chat rooms were great also, but *Second Life*, being visual, impacted my learning a lot more.

Although the research on de Bono’s (1985) six thinking hats did not provide a specific opportunity for comment on a sense of community due to all of the students being on-campus students and in the same room when the activities were occurring, there was still the following comment revealing the understanding of the importance of presence for off-campus students:

Great for feeling ‘included’ as a long distance student and for a teacher to witness the contributions of an otherwise shy student.

It is also interesting in this last quotation to note that the educational advantages of *Second Life* began to emerge.

When learning in a virtual world, students commonly discuss their feelings, actions and perceptions of engagement as being important. As previously discussed, three forms of engagement occur with students in a virtual world: affective, behavioural or cognitive. Below is a case study 1 dialogue of how engaged students felt when participating in an excursion to a theme park in *Second Life*.

Jonathon: Oh boy you have to come on this one

Jonathon: No way in RL would I be on here
 Charmaine: It looks like it's taking off again Jonathon
 Charmaine: I love the cha-cha and spin around rides, but don't go on anything that takes me upside down - or roller coasters.
 Jonathon: Quick hop on
 Allan: That's funny you are shaking your arms Jonathon
 Jonathon: Are we ready
 Allan: Yep
 Jonathon: Do you want to be at the back Charmaine
 Jonathon: Here we go
 Jonathon: Hold on
 Jonathon: Oh no do not drink on this one
 Allan: Oh my gooooooooooooooshh
 Sharon: What...might vomit...
 Jonathon: Told you it was a goodie
 Charmaine: OMG
 Charmaine: Don't look to the side!!
 Jonathon: You have to sit in the front next time
 Allan: Where is the screaming
 Jonathon: I think it is us
 Allan: Oh looking to the side in mouselook is not good...
 Jonathon: Are we throwing up there?
 Allan: Jonathon we are throwing up!
 Allan: Ha ah
 Allan: Ha ah
 Allan: That is hilarious
 Jonathon: That was cool
 Charmaine: That was the best one yet
 Allan: Nice job...
 Jonathon: Ok I think we will have to come back here
 Charmaine: Oh I'll come with you
 Charmaine: Yes, this place has been good
 Jonathon: Ok
 Charmaine: Oh this one looks good too
 Allan: How do we go higher?
 Jonathon: Which one is that
 Charmaine: The roller coaster
 Sharon: What about eyes covered
 Sharon: NOooooooooooooooooooooo....not higher
 Allan: Sharon Fraidy cat!

Figure 1: Amusement Park in Second Life



This dialogue could occur with anyone who is engaged in a ride at a theme park. However, this was a virtual experience and the students felt the experience was real as they were totally engaged in the event. Figure 1 is an image of one ride in a virtual amusement park demonstrating that real life can be replicated visually in a virtual world. The conversation illustrates that the emotions of being on such a ride can also be replicated. The students discussed screaming, being sick, wanting to go higher, being scared and wanting to return. It is this enhanced engagement and accompanying sense of community for students who are alone in their study in real life that provides a strong case for the use of *Second Life* as a learning environment.

Where to from here?

A key aspect of our research projects into the use of *Second Life*, as one example of a virtual world, has been to investigate the effectiveness of this learning environment in engaging students and enhancing their learning outcomes. The results of the three projects support the contention that this is the case and off-campus students, in particular, report that the use of a virtual world assists in providing them with a greater sense of being part of a learning community. Furthermore, the collected data are enabling us to continually refine how we teach within this virtual learning space. We are intent on improving the use of *Second Life* as a pedagogical tool in constructivist learning, a recognised aspect of this environment (Burgess, Slate, Rojas-LeBouef & LaPrairie, 2010). We are also aiming to contribute to the development of a professional development model that could be used to introduce *Second Life* as an educational tool for staff and students initially at UNE, but which could then be applied to other contexts through the introduction of “how to” videos.

Another important aspect of the research has been to ascertain whether *Second Life* can provide an opportunity for microteaching and virtual professional experience. Off-campus students are currently prepared for placement solely through readings, forum reflections and online quizzes. Moving into an area of virtual teaching practice would move preparation and support into a new realm. The emergence of new technologies that have the capacity for active experiential learning provides the potential to develop the classroom and playground spaces to permit practice teaching at least comparable to a live classroom experience and, possibly, enhanced experiential options (Aldrich, 2004). The students would have opportunities, through interaction in and with the virtual environment, to practise skills and apply concepts in a realistic setting (Antonacci & Modaress, 2008). There have been few attempts to try this form of new approach in Australia indicating this research is exciting, innovative and cutting edge.

The possibilities of expanding the virtual ‘school’ environment seem boundless. It could be used not only for our own preservice teachers, but to offer professional learning workshops for teachers and other educators or for an environment for academic learning within and across faculties. What is important is to continue the research for “the movement toward the virtual realm as a viable teaching and learning environment seems unstoppable” (Kelton, 2008, p.16) and we want to be in the vanguard for new possibilities rather than fighting a rearguard action.

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