Lego Serious Play: a three-dimensional approach to learning development

Dr Alison James
London College of Fashion, UK

Abstract

This paper discusses work underway to explore the use of Lego Serious Play (LSP) as an unconventional means of developing student learning. Designed originally as a thinking tool within the corporate sector, the techniques and applications of LSP are not those conventionally used in developing academic capacities within students. However, experiences with LSP at the London College of Fashion and that of users in other settings offer evidence of its value in aligning with other approaches to learning to provide a non-hierarchical and student-centred lens through which to consider personal growth and subject understanding. This paper suggests that LSP has an important role to play in supporting multisensory approaches to reflecting on learning, either in tandem with, or instead of writing. While the use of LSP discussed here focuses on its implementation on creative arts courses, it is a highly transferable methodology which can be applied across the spectrum of disciplines and for multiple purposes.

Keywords: student-centred; methodology; interdisciplinary; innovative.

What is Lego Serious Play (LSP)?

LSP was originally developed in 1996 by Kjeld Kirk Kristiensen, the owner of Lego, and Bart Victor and Johan Roos, professors at the Swiss business School IMD, as an innovative and effective way of exploring complex issues without obvious answers. Initially for the corporate/business sectors, its purpose was to generate 'more engagement, imagination and playfulness in staff meetings' (Roos and Victor 1998, cited Nolan 2009, p.365). Since then it has been adopted by numerous high profile organisations (Google, eBay, The International Red Cross, Roche and NASA are some examples). Full accounts

of the use of LSP in a variety of learning contexts can be found in Gauntlett (2008), Nolan (2009), James and Brookfield (2014 forthcoming), as well as in open source *LSP* guidance and many online fora. These accounts describe LSP workshop activities in detail, while here a more synthesised outline will be provided.

LSP comprises a set of activities combining metaphorical modelling, building with Lego and peer discussion to explore complex issues. Its techniques draw heavily on story and the use of metaphor through representing one thing in the form of another. *The Science of Lego Serious Play* leaflet (online) draws on Schön's view (1971, cited Lego, n.d., p.7) that metaphors are a means of 'creating radically different ways of understanding things', citing his illustration of this when 'product development researchers, trying to make an artificial paintbrush, had a breakthrough when one member of the group observed 'a paintbrush is a kind of pump''. An aeroplane is therefore not just (or even) a plane; a builder might use it to indicate concepts, values, or embody clichés ('high flier', 'sky's the limit', 'I grew wings'). A green plant is not just something for the window ledge, it may signify growth, inspiration, abundance, or it may not even be a plant at all, but hair or energy. A red rectangular piece, the archetypical brick of the early Lego packs, is not a plastic geometric shape; rather it may be heat, passion, a shoe, a person.

The ethos is playful, exploratory and creative, with freedom for participants to experiment and test out ideas without fear of failure or being wrong. Activities start with individual models, followed by shared or joint constructions, and are highly respectful of ownership and opinion. The meaning that a participant invests in a brick or a model is accepted, it is not for others to superimpose their own meaning on it, although they are welcome to make observations or offer comments. Even if participants are using what appear to be tired, old clichés (rollercoaster ride, end of the rainbow etc.), these mean something to the individual and their choice of phrase should be honoured.

LSP taps into the learning philosophy of the creative arts and design through its affiliation with constructivism (Piaget's theory of building knowledge structures, 1954), as well as Papert's constructionist pedagogy, which demands 'that everything be understood by being constructed' (Papert and Harel, 1991, online, para 3), as opposed to the 'instructionist' models of school teaching. As a student of Piaget, Papert (1999) sought to apply the former's work to his own learning theory, arguing that students learn best when constructing something and that two kinds of learning happen during this; one, an output is

created and two, new knowledge and meaning (*The Science of Lego Serious Play,* p.9). In his book *Creative Explorations* (2007), Gauntlett shares Papert's account of how he formulated constructionism through observing students making soap sculptures, noting their heightened level of engagement and creativity. The hands are central to constructionist learning, with studies of brain function showing that nerve receptors in our fingers send electrical codes to the brain via our central nervous system (e.g. the explanation of touch (n.d.) at www.faq.org). There, in the cerebral cortex, these messages are interpreted, thus we can envisage thinking as starting with our hands, as opposed to the popular assumption that the brain 'thinks' first and tells the hands to act. The *Lego Serious Play* training manual (Trivium, 2013) further suggests that, as 70-80% of our brain cells are connected to our hands, physically handling objects and constructing things activates a richer kind of learning.

The creative arts context

LSP was not invented purely for use by 'creative types', nonetheless there is much about it that affiliates with learning preferences within arts and design disciplines. Creative arts learning is predominantly visual and kinaesthetic, evolving from the 19th century preoccupation with developing creative, craft and industrial skills within a specific tradition to the interdisciplinary interests of today. Creative practitioners also often have 'portfolio careers', which allow them to perform several roles at different times, including that of practitioner-educator. Learning is problem and project based, constructionist, constructivist, about social and situated cognition, and rooted in communities of practice (Wenger, 1998). It is also often about divergent outcomes and thinking, not finding the one right answer. All of these aspects can be related to learning with *Lego Serious Play*.

While writing inhabits large parts of the learning territory on creative arts courses, practice-based and experiential learning are dominant and more popular features of the curriculum. This tension between traditional academic writing and activities which are perceived in opposition to the academic – i.e. vocational – is one that causes disjuncture in the learning development of many creative arts students, either because they are actively trying to avoid conventional academic delivery or because the vocational is sometimes misinterpreted as 'less clever' than the traditionally academic. As is well known, there is a higher proportion of students with dyslexia in studying creative arts disciplines as opposed

to others (Appleyard, 1997; James, Abi., 2003). This is illustrated by data extracted from the Higher Education Information Database 2011/12, revealing that 15% of students in arts institutions had a specific learning difficulty (most often dyslexia), compared to 4% in other UK HEIs. In addition, much work has been done to argue for a recognition of academic intelligence which is not predicated on writing, but on other modes of embodying and expressing knowledge (James, 2007; Pink, 2008; West, 2009; Robinson, 2011; James and Brookfield, 2013; 2014). Elkins (2007) and Robinson (2011) are two among those who note how strange it is that we continue to organise formal education in the post compulsory sector around the written word as opposed to the visual text. As Stephen Brookfield and I note elsewhere, this is not a new observation: 'In the 1950's and 1960's, Rudolph Arnheim (2004) noted that visual ways of learning have traditionally been viewed as inferior intellectual capacities to the logico-rational, text based models of our traditional academic structures' (James and Brookfield, forthcoming, 2014).

The challenge for learning development within the creative arts sector is often (at least) two-fold; enabling those students who struggle with producing academic writing to overcome their difficulties and also to support the recognition of other modes of learning and assessment, often associated with accommodating a difficulty, rather than being 'first choice' options. Much work has been done in universities over the last two decades to move away from a narrow menu of exams and essays to a gamut of other assignment formats and this will not be reproduced here. However, in terms of understanding where LSP might fit in as an approach to learning development it is important to remember the challenges faced within this specific disciplinary context.

Using LSP as a non-traditional mode of reflection

In the course of the last thirty years, reflection has become an established component of curricula at all levels of education and has an extensive literature to support it (e.g. Boud et al., 1985; Schön, 1987; Mezirow, 1991; Moon, 2006) which will not be explored here for lack of space. While the introduction of Personal Development Planning (PDP) helped formalise the place of critical reflection within the curriculum, reflecting is something that many creative practitioners feel is an inescapable part of making, although it may not have been articulated in quite such an explicit fashion as PDP requires. In addition, although it is an academic practice of longstanding, the purpose and value of reflection is still

misinterpreted by some staff and students as merely being a dull, paper-based review of experience. By making reflection hands on and three dimensional through modelling, LSP has been effective in deepening reflection, provoking thought and making recollections more memorable.

Across the HE sector, reflection has primarily taken written form, either in journals, logs, diaries or annotated sketchbooks, and latterly through wikis, blogging and tweeting, and more visually through social networking and video diaries. This has generated its own challenges; the continuation of a focus on writing as the primary or sole mode of recording evidence of development, and a shift in focus to make the implicit (reflecting on learning) explicit and to focus specifically on the metacognitive processes involved in the development of learning capabilities instead of on subject knowledge per se. While many staff and students have come to appreciate the purpose and potential impact of reflecting on their own learning, there are others who find it dull and divorced from the business of 'proper learning'. As a result their own engagement with it is superficial and rushed and of little interest to either writer or reader. The adoption of LSP was piloted as a means of re-energising this engagement and enabling students to deepen their insights into their personal and professional development (our PDP). On some courses LSP is used instead of writing, on others – as in the case of the International Preparation for Fashion (IPF) course which follows – in combination with textual and video records.

Thinking in 3D: the use of Lego Serious Play for reflecting on learning

LSP was first introduced at the London College of Fashion (LCF) in 2011 for staff workshops; following the success of these it was trialled as a creative and novel approach to Personal and Professional Development study, as part of an International Preparation for Fashion (IPF) course. IPF has an entirely international cohort, and prepares students (to date 360 of them) for degree study, although it is the equivalent of the first year of an undergraduate programme. Reflection is seen as an integral part of development of practitioner, identity and process of creation (James, 2004; James, 2007; Shreeve et al., 2008) and an important part of 'learning how to learn'. However, coming from diverse educational cultures, some students have encountered reflection before, some have not; LSP was also chosen as a means of bridging diverse learning cultures, and something that was likely to be new to all, as opposed to just a few.

There are important learning modalities at work in LSP– including its democratic protocols (everyone builds, everyone shares, everyone speaks) – which stimulate involvement and override issues of passivity. On the IPF programme an investment was made to work with students in groups no bigger than 12 (this year meaning 20 workshops) to maximise opportunities to build, speak and share, however it is possible to use LSP with larger groups, different lengths of time and for alternative outcomes (see also Gauntlett, 2008; Nolan, 2009), and LSP is being used with a group of 48 incoming students in Autumn 2013 to launch a brand identity project.

On IPF, Lego workshops last three hours and take place towards the end of the academic year (at present, although plans to bring them in earlier as well are under discussion) as part of a three-stage approach to summative reflection. First, students participate in a workshop, in which they develop a metaphorical, three-dimensional language through building models with Lego: with these they share and discuss their representations of their learning development, achievement and challenges, since starting at LCF the previous September. Time for building is kept short (anything from 3 to 15 minutes) and is always followed by discussion; such variation keeps momentum and focus up. There is a clear structure to the workshop in terms of techniques and activities employed, however, freedom to build wherever and however they like within the room is permitted, although a big table is the most convenient place for sharing. A student describes this construction process:

> We used this notion in mind [metaphor] to construct a Lego structure that represents our current journey in life and the IPF course. I made a structure with two tiers; the bottom is a zigzag path that represents the path of my life, which is not straightforward and a future that is unpredictable. Constructed with curved pieces jointed together, the top represents the winding journey of getting through the obstacles in my life. The metaphor for my structure is that my road towards success is narrow, complicated and unexpected. The height between the two tiers symbolises the fact that failure is a long way down and the struggle to keep staying up is the essence. (IPF participant on their Lego model)

While every student has a starter bag of Lego, they can add more to this as activities unfold and are encouraged to move around, bend down, peer around each other's models

to get a sense of height, proportion, scale and angle. Afterwards they record a reflective video in The Pod (an inflatable space with Mac and Photo booth for recording), using the five questions of Brookfield's (1995) Critical Incident Questionnaire (http://www.stephenbrookfield.com/Dr._Stephen_D._Brookfield/Critical_Incident_Questionnaire.html), to review their learning experience; these invite students to consider when they have been most engaged, most distanced, surprised, puzzled or helped during the session. Both experiences then inform their summative written self-assessments at the end of the unit. This reflection comes at an important time of transition for the learners, the majority of whom are staying on at the university to study for a creative arts degree, and needs to be meaningful.

Pioneering LSP with IPF was accompanied by two main concerns: that building metaphorically might be difficult for students communicating in a second language and that using Lego might be misunderstood as infantilising or trivialising learning. With regard to the first, I was surprised by the extent to which students felt able to engage, facilitated also by the knowledge that if they could not think of any metaphors in English (although it was surprising how many they **did** generate), they could draw on those in their own language or invent new ones. LSP is also not purist in its interpretation of metaphor (debating the niceties of whether something is in fact an analogy, a simile or other, and not a real metaphor); as long as students are using one thing to discuss another in a 'metaphorical manner' then this is perfectly acceptable. They often observed that they felt their English had developed through participating in workshops; noting they felt more able to contribute to group work and class discussions as people's attention was on the models, not individuals, which boosted their confidence in speaking. Through others commenting on, or asking questions about their models, they were gently encouraged to expand on their initial thoughts and embodied expressions. Suzanne Rankin Dia, English tutor to IPF and workshop observer, felt LSP paralleled Thornbury's (2000) analogy of promoting **real** language acquisition with the Dogme95 approach to film making which prioritises story and performance over techniques and special effects. As students had control over the topics they were discussing they had a high level of engagement linguistically and kinaesthetically. There were other cross cultural outcomes as well, with students commenting either on the differences in academic conventions and styles between the UK and their homeland or on the fact that recognising 'weakness' or areas for development does not have to be shameful, but is a healthy and helpful aspect of learning.

As to the second, there is often suspicion or uncertainty at the start of a Lego session as participants are unsure what to expect. Some are excited by the novelty, others nervous of it, while yet more may be wondering why, given their level of education and maturity, they are being expected to work with a children's toy. Beyond IPF, LSP has now been used as part of doctoral student induction, staff course and team development, to explore student engagement and how we motivate learning, and is being used in 2013/14 for industry collaborations, to examine sustainable education, and in many other contexts. At each of the sessions offered there have always been participants who have felt, or expressed, reservations as to what lies in store, but in the overwhelming majority of cases these have been dispelled by the end of the workshop. As they discover, LSP is surprisingly hard work and involves total focus and multisensory participation which is absorbing and often quite tiring. Part of the reason for this is the LSP works best when the issues being considered are complex and have no obvious answer or interpretation. Another part is that mobile phones are banned and all other bits of personal 'kit' (bags, notepads etc.) are all kept away from the building areas, which minimised distractions. Participants are allowed, however, to take photographs of their models throughout the session, and this they do frequently, which also boosters engagement and ownership.

Benefits to learning development of using LSP

While the greatest number of student users to date have been on IPF, LSP is being used in a much broader range of contexts, as already indicated; to date over 600 staff and students have participated in an LSP session of some kind. The role of the facilitator in sessions aligns itself well with that of the learning developer in that it requires the individual to work with the students so that they can elicit and model their own views, rather than being led to a single right answer or dominant interpretation. It is also an approach which reminds participants of the importance of listening to each other, rather than simply waiting for their turn to speak, and of the value of understanding different perspectives (unless otherwise indicated, the quotes which follow are from international IPF participants and are reproduced verbatim):

> One of the main things I noticed was how differently and complexly all of us think and perceive. It was almost euphoric when I was pointed out and had to talk. That is exactly what made it so insightful, the fact that no person was left out, everyone had

to take part and everyone had to present his or her thoughts and ideas. There was no presence of a usual classroom environment where there are a few dominant students. Overall the session was very soothing in a way that it made me analyse myself in a way that I would not have on my own.

It was very helpful to look at everyone else's interpretations of themselves and how they think they can improve.

The kinaesthetic and three-dimensional nature of building with Lego is another significant aspect, compared to drawing or discussing issues and progress. Part of this is to do with the neuroscientific premise alluded to earlier, and also the ability to physically touch and move around the models that have been created. Size, scale, height and depth can all be brought into play (with models suspended above tables, situated in corners of rooms and so on) which helps visualise issues in a highly memorable way. Even kneeling down to see someone's model on eye level as opposed to viewing it from a chair can affect the thoughts that spring up in relation to it.

Among many surprises for participants has been the way that using bricks can test the imagination, release observations, give rise to insights, help consolidate knowledge or access alternative ways of seeing:

For me it was amazing to see how a few pieces of Lego can boost your imagination and make you come up with different and surprising ideas.

I have understood within my model that my weaknesses lay in my tendencies to do things safely, repeat what I've done before because I know I can do it, but it is not risky nor innovative, therefore that work cannot be excellent.

As noted above with regard to language acquisition, the important three words in this second quote are 'within my model' – as the focus of LSP is that what is to be expressed is embodied within participant constructions. It is through the model that latent insights often surface or vaguer thoughts become clarified.

Participants also commented on the way that working with Lego on one aspect of their learning (reflective practice and improving metacognitive awareness) spilled into their

subject area; using metaphor for the design process, to develop ideas and research methods, as a starting point for inspiration.

> During Lego Serious Play I can find my passion and become more effective at my project proposal development.

> The Lego Play workshop did not only give us one and a half hours of fun and stress relief, but it has also subtly taught us valuable techniques and skills that can be applied into our projects, work and even our daily lives.

> When I first started working on my project and coming up with a concept, I found that my concept was too broad and I couldn't narrow it down easily. The concept I came up with at the beginning was birds, however, birds could be anything. I needed to brainstorm and think of all the different aspects of birds to use one for my project. Taking part in the Lego Serious Play helped me a lot.

> The workshop gave me further insight into the aspects of conceptualizing. Most often objects are seen as they are, not as what they can potentially become.

> This was a creative and effective way of analysing our weaknesses and our strengths. It gave me a greater sense of direction for my future plans.

The emphasis on building as opposed to writing was extremely helpful for students with dyslexia and extraordinarily effective for a student with ADHD who had major concentration and engagement issues in a classroom setting, and yet who was completely absorbed and on task during the workshop. As Stephen Brookfield and I note elsewhere,

> When Alison [James] mentioned how attentive she had been the student replied, 'It's because of what we were doing. When I can think with my fingers, I'm golden'. She went on to say that any kind of traditional lecture with power point and handouts left her crawling up the walls, whereas anything that involved activity completely held her attention. (James and Brookfield, 2014, forthcoming)

Although group bonding has never been identified as an outcome for LSP workshops, a sense of connection to or with others recurs constantly in feedback, from simply working

with others less well known, to seeing people in a different light or forging stronger links. At a time when a desire for community is similarly recurrent in feedback from students (and staff) working in isolation or across sites, this sense of belonging can be a subtler aid to motivation and engagement:

> This session taught me how to approach the project from multiple different perspectives and helped to reignite my passion for my theme. Not only did it build a new sense of perspective, but it also helped me to build a closer bond with my classmates and so it helped me feel as if I was the only one struggle with the project.

> When we give shape and form to our imagination, making them tangible and shareable, we not only reflect on them ourselves but also invite others to reflect with us. The process of sharing inspired me a lot.

The value of LSP as a means of shaking up thinking was also remarked on:

> The Lego workshop was indeed very interesting. The activities helped me to 'loosen up' my mind and somehow it felt like I was being less restricted when coming up with ideas and even words to describe my learning journey at the end of the workshop as compared to the start. By getting us to build anything out of random blocks to illustrate our learning journey, it felt like it really exercised and challenged my creativity.

> I found it was very helpful in terms of creativity, critical thinking, as well as receiv[ing] peer comments and evaluations. As a reflection of the unit, I fe[lt] involved at all time, especially the discussion after every individual task. I enjoy thinking ideas while experiment[ing] with Lego bricks. The ideology of 'do not hide behind from pre-conceived assumptions' is also applied in Lego project. I was truly inspired by the shape/form that [I] created without [a] plan – the exploration of unexpected shape surprised me and leads to something new.

Using LSP also proved a useful means of prompting students to delve into their reflective observations with a little more depth than they may habitually do – moving them from the generic statement ('my time management used to be bad and now it is better') to more

specific identification of areas of improvement and the consequences of these:

> Alison James' Lego Serious Play sessions have been exceptionally effective in changing perceptions about what reflection is and can be. In our first year the External Examiner came to visit the IPF and observe our teaching in process. He was clearly struck by the Lego workshop and took photographs. I have no doubt that students' reflective writing improved as a consequence of these innovative workshops. (Course Leader, IPF)

LSP offers flexibility, portability and transferability in terms of learning development; its techniques can be used anywhere, at any time. Beyond the workshops, student models become part of other learning memories and portfolios through the photographs and videos students take of their models, which quickly become meaningful to them as personal representations of their own learning. These reappear in their written reflections and on their social media sites as memorabilia and become reference points in discussion. They construct models in which they invest meaning and which helps them understand things that they may not have grasped through a two-dimensional or more traditional read/write process of learning. Even drawing may not have contributed the insights that constructing something did for them, due to the fact that their construction is in three dimensions, not two, and offers additional sensory information.

Challenges with LSP

For all the positive feedback generated by using LSP there can also be aspects of the process which generate resistance; two of these (fear and timewasting) have been touched on earlier. There is an interesting tension with LSP in that as a creative methodology it would appear to be something that would be accepted without question by participants in the arts, design and media. However, for some – fine artists in particular (albeit a distinct minority of them) – the use of rigid plastic bricks is seen as too constraining a format. LSP is also structured around a distinct series of protocols and applications which need careful handling to ensure that these too do not feel constricting. While many (particularly those who need convincing that this is an appropriate use of their time when they have invested money in a course) are reassured by the global track record of LSP, a few others are put off by the prospect that this is a 'corporate training tool' – its

malleability notwithstanding. In very rare cases, participants may believe that they are being psychologically analysed by the facilitator, which is completely unfounded.

As with any learning development process, sensitivity has to be shown to the energy levels of those participating in workshops, with the facilitator knowing when to 'gee up' the group, and when to let them back off and get a cup of tea. The ideal timescale and group size for LSP workshops can also be an issue in a climate of massified delivery, however, this is being experimented with and also does not preclude the very effective use of LSP as a one-to-one or small group discussion tool, once the basic skills have been acquired – an essential first step in any usage.

Furthermore, to understand the stories behind the constructions it is essential to be in the session or have the model narrated somehow: being metaphorical and/or abstract it may need interpretation, just as some art and design works may need explaining to the uninitiated or plain baffled. We can see this in the case of the student who built two models of their experience on their course side by side; one had familiar metaphors of ladders for progress and bridges between elements to signify change and movement in the course of learning, while the other, entirely black evoked their ongoing challenges with bipolar disorder, something which lives alongside their learning. While this example demonstrates a very personal kind of disclosure, it should be stressed that learners are only ever invited to include in their models that which they feel comfortable sharing: no tutor or peer should force any other kind of revelation or content. The vast majority of issues that might present themselves, however, can be dealt with through sensitive and careful facilitation and a real feel for the group – the kinds of skills that any good teacher uses.

A final obstacle in the past has been that, until relatively recently, to be able to use LSP effectively it was necessary to go on a training course and access to materials and the ability to use these limited to accredited facilitators only. With the release of LSP materials and techniques 'into the wild' (through open source avenues) this barrier has now been removed, although the author would strongly recommend training for anyone interested in pursuing this further.

Conclusion

This paper has introduced the LSP history and methodology and given examples of its use within a creative arts context, with the rider that appreciation of the potential of LSP should not be influenced by this disciplinary context as it is a highly transferable methodology, which had its origins outside art and design. Examples have been shared of how and where LSP has been used to develop student learning, illustrated with feedback on these experiences. The argument has been put forward for LSP (and other approaches of its kind) to be included as a useful adjunct or alternative to engaging students in reflecting on learning. As LSP is a highly portable methodology it has helped students transfer meanings and models into different locations and, through its three dimensional and sensory nature, has made learning more memorable.

Figure 1. Participant model of learning journey using LSP.

References

Appleyard, D. (1997) 'Education: the art of being dyslexic', *The Independent*, 27 February
(Online). Available at: http://www.independent.co.uk/news/education/education-news/education-the-art-of-being-dyslexic-1280776.html (Accessed: 25 October
2013).

Boud, D., Keogh, R. and Walker, D. (eds.) (1985) *Reflection: turning experience into
learning.* London: Kogan Page, pp. 18-40.

Brookfield, S. (n.d.) *The Critical Incident Questionnaire.* Available at:
http://www.stephenbrookfield.com/Dr._Stephen_D._Brookfield/Critical_Incident_Questionnaire.html (Accessed: 20 June 2013).

Brookfield, S. (1995) B*ecoming a critically reflective teacher.* San Francisco: Jossey-Bass.

Elkins, J. (2007) *How to use your eyes.* New York: Routledge.

Gauntlett, D. (2007) *Creative explorations: new approaches to identities and audiences.*
Abingdon: Routledge.

Gauntlett, D. (2008) *Media, gender and identity: an introduction.* Abingdon: Routledge.

James, Abi. (2003) *What subjects do students study at university?* Available at:
http://www.dyslexic.com (Accessed: 25 October 2013).

James, A. (2004) 'Autobiography and narrative in personal development planning in the
creative arts', *Art, Design and Communication in Higher Education*, 3(2), pp. 103-118.

James, A. (2007) 'Reflection revisited: perceptions of reflective practice in fashion learning
and teaching', *Art, Design and Communication in Higher Education*, 5(3), pp. 179-196.

James, A. and Brookfield, S. (2013, forthcoming) 'The serious use of play and metaphor: Legos and labyrinths', *International Journal of American Vocational Education and Technology (IJAVET)*, 4(3), July-Sept. 2013.

James, A. and Brookfield, S. (2014, forthcoming) *Engaging Imagination: helping students become creative and reflective thinkers.* San Francisco: Jossey-Bass.

Lego (n.d.) *The Science of Lego Serious Play.* USA: Executive Discovery llp. [Online] Available at http://www.strategicplay.ca/upload/documents/the-science-of-lego-serious-play.pdf (Accessed: 2 June 2013).

Mezirow, J. (1991) *Transformative dimensions of adult learning.* San Francisco: Jossey-Bass.

Moon, J. (2006) *Learning journals: a handbook for reflective practice and professional development.* 2nd edn. New York: Routledge.

Nolan, S. (2009) 'Physical Metaphorical Modelling with Lego as a Technology for Collaborative Personalised Learning', in O'Donohue, J. (ed.) *Technology-supported environments for personalized learning: methods and case studies.* USA: Information Science Reference, pp. 364-385.

Papert, S. (1999) *Papert on Piaget.* Available at: http://www.papert.org/articles/Papertonpiaget.html (Accessed: 17 June 2013).

Papert, S. and Harel, I. (1991) *Situating constructionism.* Available at: http://www.papert.org/articles/SituatingConstructionism.html (Accessed: 25 October 2013). First published in Papert, S. and Harel, I. (1991) *Constructionism.* Norwood, NJ: Ablex Publishing Corporation.

Piaget, J. (1954) *The construction of reality in the child.* New York: Basic Books.

Pink, D. (2008) *A whole new mind: why right brainers will rule the future.* Marshall Cavendish, New York: Penguin.

Robinson, K. (2011) *Out of our minds. Learning to be creative.* Chichester, UK: Capstone.

Schön, D. (1987) *The reflective practitioner: how professionals think in action.* New York: Basic Books.

Shreeve, A., Wareing, S. and Drew, L.(2008) 'Key aspects of teaching and learning in the visual arts', in Fry H., Ketteridge, S. and Marshall, S. (eds.) *A handbook for learning and teaching in higher education.* 3rd edn. London: Kogan Page, pp. 345-362.

Thornbury, S. (2000) *'A dogma for EFL', IATEFL*, Issue 153, February-March [Online]. Available at: http://www.thornburyscott.com/assets/dogma.pdf (Accessed: 13 August 2013).

Touch (n.d.) Web page defining physiology of touch. Available at: http://www.faqs.org/health/topics/3/Touch.html (Accessed: 25 October 2013).

Trivium (2013) *Facilitator's manual: designing and facilitating workshops with the Lego Serious Play Method.* Not for publication.

Wenger, E. (1998) *Communities of practice: learning, meaning and identity.* New York: Cambridge University Press.

West, T. (2009) *In the mind's eye: creative visual thinkers, gifted dyslexics and the rise of visual technologies.* Amherst, NY: Prometheus Books.

Author details

Dr Alison James is Associate Dean, Learning and Teaching, at the London College of Fashion, with particular interests in personal and professional development (PPD) and enhancing reflective capacity in students using alternative approaches to writing. Some of these are housed in her online resource for supporting student engagement with PPD – PPD Coach (http://www.arts.ac.uk/ppd). She is the co-author, with Professor Stephen Brookfield, of 'Engaging Imagination: helping students become creative and reflective thinkers', which is being published by

Jossey-Bass in April 2014. She is an accredited Lego Serious Play (LSP) facilitator and in 2013 she won a UAL Excellent Teaching Award for using LSP to enhance student learning and staff and educational development.