RESEARCHING PHOTOGRAPHIC PARTICIPATORY INQUIRY IN AN E-LEARNING ENVIRONMENT

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ABSTRACT. This article focuses on the use of Photographic Participatory Inquiry (PPI) in researching the teaching and learning of photography in the e-learning environment. It is an arts-informed method drawing on digital tools to capture collective information as digital artefacts, which can then be accessed and harnessed to build critical and reflective photographic practices. The multimedia tools employed (for example GoPro video and screen capture) are critically discussed for their potential to contribute understanding of photographic artistic practice and the learning of a digital generation. The article may also provide critical insights and inform more nuanced methods for research and scholarship when wishing to investigate the personalized, participatory, and productive pedagogies of a networked learning society.

MIEUX COMPRENDRE L'ENQUÊTE PHOTOGRAPHIQUE PARTICIPATIVE DANS UN ENVIRONNEMENT D'APPRENTISSAGE EN LIGNE

RÉSUMÉ. Cet article porte sur l'utilisation, en contexte d'apprentissage en ligne, de la photographie participative comme méthode de recherche dans le domaine de l'enseignement et de l'apprentissage de la photographie. Cette méthode, fondée sur les arts, s'appuie sur l'utilisation d'outils numériques pour recueillir de l'information sous forme d'artéfacts numériques, artéfacts pouvant ensuite être consultés et exploités pour élaborer des pratiques photographiques critiques et réflectives. Les outils multimédia utilisés (par exemple, des vidéos GoPro et des captures d'écran) et leur potentiel à contribuer à une meilleure compréhension des pratiques de photographie artistique et d'apprentissage de la génération numérique sont examinés sous un angle critique. Cet article peut également fournir des perspectives critiques et engendrer des méthodes de recherche plus nuancées pour ceux désirant enquêter les pédagogies personnalisées, participatives et productives d'une société d'apprentissage en réseau.

Students today live in a society that consumes multimedia. In tertiary education, one significant challenge for academics teaching photomedia is how to research and reflect on their own e-learning pedagogies in order to build students' critical reflective practices. This challenge begins with identifying research tools and

methods that can accommodate the personalized, participatory and productive pedagogies of a networked learning society (McLoughlin & Lee, 2008). Under such conditions, the need emerges to build reflexive learning opportunities for both the educator and their students. For the researcher / photographer-educator (hereafter R/P-E), this requires developing research and teaching approaches in e-learning photographic practices that can engage a generation now immersed in visual culture, visual processing and the digital stream, and using apps such as Instagram, Twitter, Facebook and Hipstamatic. Research reports that for many students, including digital photography students, the social function of photographic images has overridden the ability to see the photograph as an object (Garry & Gerrie, 2005; Harrison, 2002; Jones, 2010). Students constantly use the digital image as their primary communication tool, such as sending selfies. Such an orientation to the image reflects the immediate desire for a click-flick action and a return response from the recipient, this over and above any deeper consideration of either the subject matter or the technical and aesthetic intentions being carried by the image. This presents a significant challenge for the educator wishing to build more technical and aesthetic-considered learning in students entering a range of professions where the skills of creating successful digital images are critical.

As a response to this challenge, this article focuses on the use of *Photographic Participatory Inquiry* (PPI) in researching the teaching and learning of digital photographic practice. PPI is an arts-informed method drawing on digital tools to capture collective information in the form of digital artefacts which can then be accessed and harnessed to build critical and reflective photographic practices. Operating in an e-learning studio environment, it focuses on digital photography as a unique representational practice, this in a media world that acknowledges the increasing role of audience and the importance of the digital artist in developing their reflective and co-constructed knowledge through both physical and e-learning interactions. PPI affords opportunities for the R/P-E to rethink their traditional photographic pedagogies and to build a framework for reflexive inquiry (Mockler & Sachs, 2011) better tailored to the e-learning environment. In this environment, students use a range of multimedia tools that comprise software i) for specific photographic image manipulation and production and ii) image capture power to store and retrieve multiple levels of imaging history (including screen capture, video and voice data files).

PPI can also be used as a research method with potential to investigate the quality and experience of e-learning interactions in photographic visualization. The method traverses practice-based research, arts-based inquiry, and the wider educational field of critical or emancipatory approaches to participatory action research (Kemmis, 2001, Kemmis 2006). It draws on visual qualitative research methods (Pink, 2004; Prosser & Schwartz, 1998; Rose, 2007), in particular photo and video elicitation, in recognition of the significance of visual culture in learning and research (Pink, 2007). This article describes the use of these

e-learning tools when using PPI to research photographic digital pedagogies. In particular, it focuses on how the digital tools can build critical and reflective photographic practices. In the final section, the authors consider the strengths and weaknesses of using PPI in researching the teaching and learning of digital photography in an e-learning context.

RESEARCHING DIGITAL PHOTOGRAPHIC PRACTICE

Photographic practice in the artistic digital domain finds the digital photographer concerned with the deep natural, social, cultural, and aesthetic insights captured by light and time, specifically their ability to communicate these flickering moments with clarity to an audience. Photographic practice is understood as the digital artist's intentional actions to capture images via the camera to bricolage the material world, light and time, and social and cultural experiences informed by past memories and present actions.

This research orients itself around the two key visual cognitive activities identified in the traditional photographic techniques of pre- (before the image is taken by the camera) and post- visualization (the processes of image manipulation for the taken image) (Adams, 1934; Uelsmann, 2002), as these apply to digital photography. What is currently known about the visual practices of digital photographic students is that digital software provides powerful post-visualization tools. However, these post-visualization tools are generally being approached on a superficial level with students developing a "we can fix it in Photoshop" predisposition. The craft of the camera, or indeed its functional and technical capacities (as in the pre-visualization act), now takes a secondary focus for the digital generation. The photographic educator is constantly presented with naively gathered or ill-conceived images and observes the student struggling with the reality of being unable to digitally manipulate a failed image. However, in the contemporary multi-literacies learning environment (Cope & Kalantzis, 2000), the camera lens and the computer are now bound in such a way that, for the student photographer, all images and their social and cultural context override the more traditional function of the image as an object of contemplation. This phenomenon requires a reconsideration of the appropriateness of traditional photographic teaching and learning practices used in tertiary education, and asks instead, what are the potential pedagogical benefits of the new e-learning and communicating environment? The research will seek to gather information about students' cognitive, affective, and performative practices used in both traditional and digital photography.

DIGITAL PHOTOGRAPHIC PRACTICE INFORMED BY ARTS-BASED INQUIRY

PPI in digital photographic practice is informed by arts-based inquiry (Finley, 2008), arts-informed research (Barone & Eisner, 2012), and art practice as research inquiry in visual arts (Sullivan, 2005). An aim of PPI is to make

academic thinking and social theory practice in digital photographic practice more accessible to individuals outside the academy (Rees, 2010). In the generation of meanings and the investigation of aesthetic choices (Bresler, 2006) when making images, PPI focuses on the connections between aesthetic spaces that emerge in the dialogical encounters between student, teacher and other audiences. Using arts-based inquiry, the student / photographer / artist is guided to employ levels of aesthetic, conceptual and reflective inquiry in order to build visual and verbal narratives about their own photographic practice. They create, describe, and reflect on their cognitive and expressive processes and, in turn, communicate their own learning to an audience or to the educator. The R/P-E, using PPI, then examines the documented photographic art practices of the students. These include the products of artistic inquiry; reflective insights of the student / photographer / artist and their e-learning journal as process thinking. PPI offers both the students and the R/P-E a method with the potential to explore the generation of aesthetic spaces surrounding the production of digital images through examining their own and others digital photographic practice within an e-teaching and e-learning studio environment.

The collection of the digitally documented photographic practice and the e- learning journal as data sets constitutes the core of the study of PPI. In addition, to enhance validity the R/P-E is able to draw on a wider range of data using multiple data sets, for example survey, video and photo elicitation interview strategies. These sit alongside the co-constructed conversations and reflective writing of the educator and student (Bresler, 2006). The R/P-E is also informed by their own artistic practice and reflective narratives that must, at all times, be acknowledged as a viewpoint of significance in the research.

PPI affords the student the capacity to build new understandings of contemporary image usage for extended social function, such as in advertising and photojournalism; to offer quick visual communication of events, such as designed Instagram moments or edited selfies; and the ability to develop a set of sophisticated skills for communicating to complex audiences through illustration or exhibition. This set of production and communication skills is fundamental to the integration of digital images into artistic practice (Wright, 1998) and to a wide range of professions who increasingly acknowledge the cognitive role of images in contemporary life (Stafford, 2007).

Questions then emerge about which teaching and learning strategies inform "knowing when doing," both when taking an image with the camera and when working with computer software to manipulate images. In approaching such a learning dilemma, the research questions need to be balanced against the flip side of the beauty of this post-visualization world and the creative potential the computer holds. In this world, you can add to or subtract from an image or create a new world and a new moment of an imagined time, rather than accepting the reality fixed in a pre-visualized frame.

How to develop the students' skills to create digital objects for audience impact or contemplation will require the student to build their own critical and reflective pedagogies. For the R/P-E seeking to improve their students' learning outcomes, they must find methods that harness the potential of an electronically supported teaching and learning platform both as an image creation tool and as a teaching and learning research tool. The digital photographic e-learning environment is now able to capture the cognitive work students do when creating images and can also simultaneously collect multiple forms of digital data that can be analyzed, merged, and interpreted by the R/P-E to build a better picture of how this generation of students approaches their learning. The challenge in researching digital photographic practice is to consider how and what data to gather so that it can accommodate both the personalized, participatory, and productive pedagogies of a networked learning society and inform the R/P-E about the co-construction opportunities that emerge in the studio learning environment (Hetland, 2007). This co-constructed environment is based around a reflection loop with the R/P-E via the e-learning journal, where the student has documented process, their research of industry and artistic trends, their research of technical elements, and the ways they have identified that future projects could be improved based upon reflection of past projects.

The study asks what are the benefits for pedagogical research of i) the new visual multimedia environment with its image, storage, capture, and processing facilities and ii) the image, screen, sound, and video capture computational power of tools such as GoPro and screen capture to provide rich data sources of information for analysis? For example, the GoPro, a video camera worn on the head, captures first person video footage that can be viewed in combination with other images captured by the digital camera in the same time frame. Finally, how can the R/P-E best utilize this data to develop critical and reflective practice within a research-in-action project? This article presents the potential of multimedia data to provide the appropriate research information and processing tools that will enable the R/P-E to answer questions connected with teaching and learning in such an e-learning context.

PPI: DOING AND REFLECTING

In the context of higher education research, PPI has been conceptualized within a multimedia e-learning environment. It draws together the data collected from the arts-based inquiry of student practices and the arts-informed research data located in digital photographic practice as a component of self-reflective participatory action research for the educator (Denzin & Lincoln, 2005; Gallagher & Kim, 2008; McTaggart, 1997; Mockler & Sachs, 2011). It draws specifically on the definition of the critical practitioner action research model by Stephen Kemmis (2008) from social science research into visual photographic

teaching and learning research. The model acknowledges the complexity of co-constructed meanings when reflecting and acting and sees critical practitioner action research as the ability:

> to investigate their shared reality in order to transform it and to transform their reality in order to investigate it, that is, by making changes in what they do and gathering evidence of the observable conduct and historical consequences of their actions for different people and groups involved and affected in terms of the cultural-discursive, social, material-economic and personal character, conduct and consequences of the practice. (p.136)

Such a definition acknowledges the student(s) and educator as co-participants in the exploration of the phenomenon of photographic image creation in the photographic e-learning environment. Attention therefore needs to be given to how meanings merge when data such as video footage from the GoPro camera, images from screen capture tools, digital audio files, and students' arts-based processes in action along with students' critical reflections and artistic intentions are shared by both parties in this e-learning environment. This digital data, as artifacts, carry the image-making process history of the students and their narrating voice, and together they reveal, for both the student and the R/P-E, how interpretive and discursive orientations emerge when reflecting on learning.

PPI could be described as visual participatory inquiry as it embeds a critical-practitioner action research orientation together with reflective arts-inquiry strategies (Butler-Kisber & Poldma, 2010; Finley, 2008). The significant reflective arts-inquiry strategy employed in PPI is the use of the photographic e-learning journal, as it is a self-reflective digital database into which the students can add video data, digital images, digital images in process, critical writing, other commentary and affective responses. PPI and its photographic e-learning journal could also be seen as capturing the intentions of a/r/tography as the student and researcher are the artists, researchers and educators (Irwin & Springgay, 2008). Here, writing about an artwork and making an artwork are not separate but rather are interwoven, both enhancing one another within practice-based research (Irwin, 2008; Irwin & de Cosson, 2004). This tight definition of a/r/tography locks it within arts-based inquiry and practice-based research as evidenced in the e-learning journal (Irwin & Springgay, 2008). The e-learning journal is data rich and allows the image making processes, practices, and reflective words to be retrieved later, reflected upon, adjusted and shared electronically. This data also contains beliefs and opinions, technical notes, artistic ideas, reflections, quotes, poetry (Grauer & Naths, 1998). Most significantly, the opportunity to add digital sound and video files resonates with what Angharad Valdivia (2002) terms an "ethical theory of voice" (p. 435).

PPI as a research method acknowledges the e-learning environment of the digital native and provides a legitimate means of capturing the nature of photographic visualization practices that is dependent on the students' consciousness of their

audiences or client who later views the image and of their own intentions when creating photographic images. Such a consciousness has been termed "interaction aesthetics" (Xenakis & Arnellos, 2013). The e-learning platform can simultaneously capture the images, record the thinking and making processes, as well as identify new learning events as they appear during this image creation phases. In addition, it can provide space for critical reflection resulting from this compilation of information. Images can now be viewed, reviewed, and narrated upon when reflecting. PPI and the photographic e-learning journal can also capture the "in between space" that operates when reflecting on and creating images. The student can now talk about why and how they have captured the image in such a way, and it affords them the opportunity to validate their decisions by comparing multiple digital files. Student thinking when reflecting, undoing, and redoing is now a documented multiple imaging process. At any point in the development process, images can be digitally saved and students can question the technical and interactional aesthetic of their image by comparing digital images in conversation with self and others. Different file sets can be shared and reflective conversations had between peers and the R/P-E. PPI is therefore a powerful tool when seeking to identify the cognitive and liminal moments between old and new ideas that emerge when rendering new image possibilities (Grushka, 2008).

PPI responds to the criticism by Rees (2010) of arts-based inquiry that claims arts-based inquiry is neither art nor research. PPI is active learning (Drew & Mackie, 2011) and synthesizes both critical participatory action research in education and arts-informed research. For the R/P-E, who models their own pedagogies within PPI, attention must be given to the way participatory inquiry opens up mutual communicative spaces for collective reflection and for learning between the teacher and student. Such spaces reveal how arts practices are constructed and evolve over time within socio-cultural contexts.

For the R/P-E and the photographic student, PPI allows collaborative reflection, as together educator and student can pay attention to i) reflection on action, "what am I going to do?"; ii) reflection in action, modifying when working and iii) reflection for action, "how I am going to do it better?" (Grushka, McLeod & Reynolds, 2005). The e-learning tools allow digital photos, digital image processing, video and audio recording devices, and files, in combination with photo and video elicitation methods (Blinn & Harrist, 2011; Harper, 2002) and visual analysis methods (Pink, 2003) to come together. In dialogue, the student and the R/P-E work with images, record reflections and co-construct insights. These methods provide points of connection between the image as object (albeit digital and virtual), the student and their aesthetic choices and the R/P-E, thus opening up conversations about the phenomenon under investigation.

RESEARCHING PHOTOGRAPHIC PRACTICE IN AN E-LEARNING ENVIRONMENT

PPI and its related multimedia tools are used by the authors to research the photographic e-learning tertiary environment, focusing specifically on the doing and reflecting of the digital photographic visualization stages of pre- and post-visualization. To capture the data from these two visualization stages, multimedia tools will be selected and operationalized in three phases: Phase one: GoPro video capture and data analysis; Phase two: screen capture video software as an analysis tool for understanding post-visualization; and Phase three: visual participatory inquiry. In this last phase, the data from phases one and two are combined in the photographic e-learning journal and then collaboratively dialogued using photo and video elicitation interview approaches that can overlay the narrated voices of the student and the R/P-E.

Phase one: GoPro video capture and data analysis

The GoPro, a video camera worn on the head, captures first person video footage of the photographic student as they orientate their camera to their subject matter and prepare to take an image - the pre-shutter position. The GoPro video camera is used in the pre-visualization stage, when the photographer is physically shooting the object or subject matter. This tool takes the image from a position that cannot be afforded by a large video camera, which, in qualitative research, occupies the observer position.

The GoPro first person recorded view is not what the eye is seeing through the viewfinder of the camera but the view through the GoPro lens. This provides a wider perspective to that of the camera lens and can therefore capture the surrounding scene and visual thinking of the photographer (Figure 1). Visual thinking includes consideration of how the object of focus in the image is to be aesthetically represented within the photograph, such as larger or darker. Past experiences of the photographer about how the object has been represented may determine the significance of the subject relative to the entire scene, such as light and related movement occurring outside the image frame. This pre-visualization moment, as the student selects the image prior to taking the photo shot or pressing the shutter, can provide insight for both the student and educator as they reflect on the student's decisions. Was there a better shot missed than the one captured? GoPro footage records and stores all of the physical moves of the photographer prior to taking an image. These movements can later be analyzed and commented on by the student or the R/P-E to reveal reflections about the student's inner conversations prior to taking the photograph.

In Phase One, both the digital camera image(s) and the GoPro video footage will be viewed side by side. This enables the photographer to analyze the student's spatial awareness, framing and the technical decisions being taken. There are a number of reasons why the GoPro camera is an ideal data collection tool:

1. It is very easy to use with relatively little instruction needed.
2. For the post interviews, its wide angle of view offers a wider perspective, capturing more than the eye may have focused on.
3. It records high quality video in a relatively small amount of storage.
4. It is small and relatively unobtrusive.
5. It can easily been worn with a head strap giving the eye's perspective.
6. It is robust and relatively low cost.

FIGURE 1. *GoPro footage from eye-level of the photographer*

One of the key reasons for conducting a post analysis of pre-visualization is that most people cannot practice their art form and give a verbal commentary at the same time. Thus footage will be used to trigger memories of the events where the students felt they were successful, where there was frustration, and where they believed they could have seen different images to those captured. The video data can also be replayed multiple times in the analysis of possible affective and cognitive decisions taken by the student. More significantly, these can be later overlaid with the post-visualization data to better inform the complexity of the decisions that need to be made in the construction of a photographic image.

The pre-visualization process encompasses all the affective and cognitive work that occurs pre-shutter. Once the shutter is pressed and the image is captured, we move on to the second phase, which is post-shutter or post-visualization, where the photographer is sitting in front of the computer and editing the images from the shoot. In this phase, screen capture tools work to collect the history of how images are selected and edited, and image iterations and manipulations are recorded with screen capture software via QuickTime. Both of these stages are crucial to the production of effective imagery. Without effective application of the aesthetic and technical aspects of the camera and the light related to the object of focus in the pre-visualization stage, the benefits

of digital manipulation tools cannot be harnessed. The initial limitations of a poor photograph cannot be improved by computer manipulations.

Phase two: Screen capture video software as an analysis tool for understanding post-visualization

The second phase, post-visualization, uses screen capture software to record the image thinking or cognitive processes as the student creates their photograph. Screen capture is built into QuickTime and records everything occurring on the screen (see Figure 2). Thus the process from downloading the imagery, editing and final selection of the image can be recorded. This thinking includes the selection of the captured image, followed by editing the image, and/or re-visualizing the photographic image. The image in this phase has moved from the "mind's eye" to digital capture and then to the computer, where it is processed and manipulated to assume physical and tangible reality based on pixels, ready for online delivery or print.

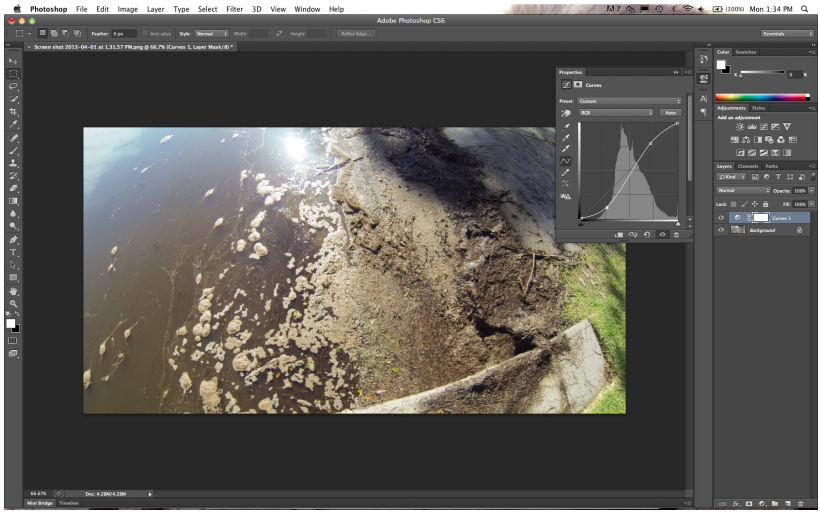

FIGURE 2. *Screen capture of the editing process*

As seen in Figure 2, the editing processes that have been used are readily identifiable. The whole screen can be viewed, making it easy to examine how the student has used the tool palette. Another software app used in conjunction with screen capture video software is PinPoint, which enables a visual display of the keyboard short cuts that are being used by the student in the screencast recording. This feature supports the researcher and student in the analysis and discussion of keyboard actions and mouse interactions on the screen, which can contribute to the reflective process when editing.

Both the student and the R/P-E, together or independently, can access the stored creation history of the photograph using the screen capture tools for

strategic analysis. The student and the R/P-E can ask: Do I crop the image? What changes have I made to the hue, exposure or contrast? How effective has been the use of multiple images in the construction of the photograph? In collaboration, they can make different choices and decide to rework the selection of images or alter the editing process. The selecting and processing of the imagery can take just as much time and practice as the technical and interaction aesthetics composition considerations that occur in the pre-visualization stage. Interaction aesthetics focus on the perceived factors that may impact on the decoding of the photographic imagery by the audience or client who later views the image. The photographer needs to be aware of the relationship between themselves as the artist, the world in which they are producing work, and the audience that is engaging with their photomedia imagery. This second phase can also be the most frustrating and time-wasting for the student if they do not develop a clear understanding of which visual methods, subject matter, and processes are more effective for each client group. Analyzing and reflecting on past processes and decisions can therefore be vital to developing effective photographic processes and refining individual aesthetic solutions. This reflection process can be captured in the photographic e-learning journal which enables the student to use all forms of media from their photos, video footage from GoPro, screen capture, voice recorded video, as well as traditional written text. Once the visual data is captured during the pre- and post-visualization, this data, along with the photographic e-learning journal, can now be harnessed and applied with photo and video elicitation research methods within PPI.

Phase three: PPI – Photo and video elicitation interview

For the researcher PPI is applied in the final phase where the student's participatory voice through photo and video elicitation interviews is juxtaposed with the student's screen capture, their photographic e-learning journal and visual data connected on their image. As the project will use first person data, it aligns with the photo-voice approach originally developed as a participatory action research method, where individuals photograph their everyday actions. This approach responds to previous criticism about photo elicitation methods. Pink (2004) claims that research needs to reduce the detachment between the researcher and the object of study and between the interpretive representations and the validity of the research findings. Visual methodologies using first person data can provide a way for higher degree photographic students to provide their expert dialogue with the researcher about their experiences (Gallagher & Kim, 2008; Thomson, 2008). This phase prompts analysis and interpretation as a two-way process or dialogue between the R/P-E and the critically reflecting student.

PPI uses questioning based around the photographic experience from a technical and an interaction aesthetic level. To recap, the reflective process of the student

occurs in two phases. First, the student is exposed to hands-on processes of learning in the photographic studio and e-learning environments, where they explore techniques. Secondly, the student reflects through the creation of an e-learning journal that documents research, experimentation and concept development. This e-learning journal becomes the hub for processing and improving work through reflection. Phase 3 will seek to analyze the meanings associated with the envisaging and the construction and editing phases of photographic image production.

Data from the pre-visualization / pre-shutter and post-visualization / post-shutter processes are entered into a timeline in video editing software with juxtaposed images and video. The student is provided with the opportunity to organize their files on the timeline to create a synthesized self-narrative. Led by the R/P-E, the photo and video elicitation conversations would explore the image capture processes, the selection of images for editing and the processes developed by the student. All of these production conversations between the student and the R/P-E are linked to the student's personal intentions and how they are considering these in relation to their audience along the production timeline. Various layers of reflection will be drawn upon in the conversation interview. These include how:

- the combined GoPro footage and the photographic images synced as a multilayered narrative to enable reflection both from the eye level view and the lens view;
- the post-visualization recorded by screen capture software and the photographic e-learning journal combined and used for self-reflective analysis in relation to selecting and editing images; and
- reflection on the final collection of completed computer manipulated photographic images as a body of work.

This timeline work enables the student and R/P-E to begin to construct a new narrated critical and reflective conversation about what has taken place. To support participatory inquiry and discovery about the quality and intentions of the photographic work the interview process does not need to be rigidly structured or scripted using terms that will elicit certain responses. Rather the questions are open and fluid allowing the student to enter into the above-mentioned layers of analysis to extend their learning. Thus the photo and video elicitation interview approach in PPI generates a newly co-constructed narrative about making photographic images. Together in analytical conversation, the student and researcher build a verbal description of the processes used and the effectiveness of the digital image.

DISCUSSION: OPPORTUNITIES AND LIMITATIONS OF PPI METHOD

PPI could be described as a pedagogical method and a research site. Contextualized in an e-learning environment, it is able to capture both reflective learning and its products simultaneously for the student and the R/P-E. More importantly, the technologies build a range of aesthetic representations. Together the student, and the R/P-Es perform an arts-based inquiry within the relationships between the captured images, conversations, creative manipulation, writing, and reflections. More importantly, these can subsequently form the basis of new strategies for the student while the R/P-E can refine their teaching strategies.

In addition, PPI embeds digital e-journaling as a method already used in research (Butler-Kisber & Poldma, 2010) but within a more aesthetic and reflexive encounter. Visual and e-learning journals enable the student to engage in lived research and to develop an embodied and relational understanding between self and other (Jevic & Springgay, 2008). As such, the digital e-learning journal can capture the spaces between the original image, the dialogues between self and others, the aesthetic choices, and the articulation of their interactional aesthetic intent by the overlaying of the critical and embodied writing about the digital image and its production. Together they are captured and interwoven in this e-learning virtual space enhancing one another (Irwin & de Cosson, 2004).

PPI offers the student a means by which to research their own photographic practice-based research and the R/P-E, in collaboration with the student, is able to research through arts-based methods, the e-learning photographic teaching and learning processes. The co-constructed and dialogical nature of this inquiry, which focuses on taking time to analyze the production process, the editing process, and the critical reflective process for the student, is presented as facilitating the refinement of the student's photographic practice, the curriculum, and the teaching and learning strategies of the R/P-E. These methods provide points of connection between the image as object, the student and their aesthetic choices, and the R/P-E. This data-rich e-learning site opens up the next space of research between curriculum and pedagogy for those seeking to explore the dialogical and participatory space of this new learning environment.

The images and actions as data captured using GoPro and screen capture video footage are increasingly gaining popularity in research as they can be used without learning interruption, particularly within the education arena (Patton, 2002). They can support the collection of data in chronological order while capturing learning processes. GoPro and screen capture software features can also provide students with an appealing set of digital devices that can support meta-cognitive and reflective development in their own photographic visualization practices. In addition, unlike traditional photo-voice approaches that focus mainly on post-descriptive, persona, and affective reflective responses

to images, PPI allows spaces for the technical or interactional aesthetics areas of the photography to be examined in a reflective and looped manner during the making, editing, and reflective processes.

The limitations of photo and video–elicitation within PPI are i) it is a relatively time-consuming activity (for the researcher and interviewee) and this may present as a key factor when using this method; ii) as a first person analysis tool in the process of the creation of photographic images, it may also focus on the student's intentions and technical skill development over the communicative impact of the image itself. Remaining in the first person position does not offer the opportunity for the student to step back from the subject position to allow for an objective observer stance or a more critical assessment of the possible meanings that could be generated by an audience. This creates an initial problem for the R/P-E aiming to ensure plausibility and believability (Prosser, 1998), for instance, about their interpretation of student intentions during their learning processes. As the R/P-E is always positioned as the audience, care must be taken to check for ambiguity of image meanings between the R/P-E and the student. It is essential to be able to explore all interpretive meanings (Prosser, 1998) and accept multiple and complex possibilities of meaning. This requires the R/P-E to develop a level of trust and agreement during the interactions between the interviewer and the student as they negotiate these meanings. It also requires the students to be open to the critical and interpretive voices of their peers and the R/P-E. However, it would appear that the opportunities and potential outweigh such concerns. The photographic e-learning journal together with photo and video- elicitation is able to generate a conversation that can overlay the technical processes and working images with reflective insights as they occur in chronological order. Such an approach increases the validation of the interpretive insights of the R/P-E and the student as it does not simply rely on memory recall but draws on detailed research and process information behind the creation of the image. The overlaying of narrative together with the e-learning journal may also capture the feelings and explicit intentions of the student photographer. The cognitive processes of description and analysis can further be elaborated in negotiation with the R/P-E.

Collier's classic assessment of photo-interviews found that while pictures elicited longer and more comprehensive interviews, they also helped subjects overcome repetition found in conventional interviews (Collier & Collier, 1986). Through focused semi-structured interviews, photo-elicitation can limit repetition and potential sidetracking of conversations. However, the R/P-E will need to focus on an analytical dialogue about the learning and the interactional aesthetic considerations. It is anticipated that this would result in a more complex critical engagement about elements such as artist intention, audience impact, attractiveness, satisfaction, sense of balance, harmony, sense of control, fun, and truthfulness within the construction of an image. A major weakness in the teaching and learning of contemporary photography is the lack of scrutiny

over the selection and fallibility of the images taken by the student. Therefore care needs to be taken when entering this photographic personal learning space of the student. The PPI process does, however, have the potential to engage the students in ways that utilize a range of multimedia tools familiar to the digital native. It supports them to develop learning stories that can embed their critical reflections and build knowledge of their own thinking and creating for meaning, beyond the idea of an image that is to be clicked and flicked.

Drawing on visual methods in qualitative research (Pink, 2004, 2007; Prosser & Schwartz, 1998; Rose, 2007), the multimedia devices used in PPI are presented as having the capacity to both overlay and juxtapose images and voices in new ways. Students can view their initial captured images, talk about their initial thinking prior to taking a photograph, and view this set of information next to the key image creation moments captured during the manipulation of the photograph in the computer. It also offers opportunities for experimentation that could be concurrently explored. The student is able to work on two or more images at once, and all of these images can be reflected upon for personal affective intentions, technical processes and interactional aesthetic decisions. The photographic e-learning journal environment is able to capture the complete journey of the photograph, the reflective journal thinking of the student, and how this thinking has been modified during the reflective creative process and post image creation. It is anticipated that with careful phasing of the processes within the e-learning environment, the R-P-E will be able to build new co-constructed conversations that will benefit both the educator and the student. This may become the strength of PPI as together with the R/P-E, the student can negotiate meanings and technical strengths as a major point of the analysis and interpretive consensus, and plan for future outcomes for both the student and the R/P-E.

Thus, PPI presents as having dual outcomes: Firstly, the data collected informs the self-reflective pedagogy of the inner and social conversations of the image maker (Catterall, 2005, pp. 3–4). Secondly, it provides valuable insights for the educator as researcher about the teaching and learning environment they create. Kemmis (2001) argues for integration between "university educational research and practitioner research" because "it is essential to the well-being of educational research itself" (p. 15). Photographic participatory inquiry is able to accommodate this integration space as it positions the actions, images, and words of the students as central to the inquiry. PPI lies within arts-based inquiry and art practice, such that its e-learning products are able to capture what Irwin (2008) describes as a living performance through engagement with their artistic practice.

CONCLUSION

At this point in time, there is a paucity of research into digital photographic teaching and learning in the tertiary educational setting. PPI is a form of inquiry that directly addresses learners and learning in a digital environment. It builds on the three separate ideas that students are digital natives, that they have had different experiences in photography and work, and that they learn differently. Digital multimedia tools may be used to extend current research methods, and such methods can, in turn, offer insights into teaching and learning photographic practices. Used in teaching, participatory inquiry that draws on multimedia offers ways to support the analysis of imaginative and cognitive processes. In particular, PPI may be described as "research as pedagogy" where empirical data is generated and applied in the course of investigating how students learn digital photography in an authentic teaching context. Multimedia tools are used to build a record for both student and teacher. The rich digital data sources can be used in visual analysis to i) explore student behaviors in pre- and post-visualization photographic work; ii) record image creation pathways to capture student imaginative and cognitive processes; iii) access participatory voice in photographic visualization and practice; and iv) employ multimedia in an arts-based inquiry approach to mediate direct experience and build potential for reflexivity in the digital environment. The multimedia tools presented in this article and framed as a research pedagogy draw on arts-based research practices that are able to reveal both the technical and the aesthetic within the meaning-making processes of the photographic e-learning environment. These may be critical for the improvement of e-learning strategies and offer more nuanced methods for research and scholarship when investigating the quality of pedagogical interactions in photographic visualization practices.

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