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# Pot throwing: How can an ancient experiential experience, be evaluated in terms of assessing experiential and tacit knowledge.

*This article explores the assessment of experiential and tacit knowledge, within a craft process, through the capturing of a pot throwing performance by digital data capture, narrative and anthropometric analysis. It follows a structure of integrated methods as described by Plowright in 'A Framework for Integrated Methods, FraIM' The integrated methods can provide a more complete understanding of the performance. Task analysis, enabled skills needed when throwing, to be examined. The compilation taxonomy outlines the proposed separation of performance activities and their assessment.*

*This understanding will aid the practitioner and student in the refinement or acquisition of skills needed for a throwing performance.*

*Future work leading from this study could be applied to other craft areas inclusively involving crafter, material and tools, tacit knowledge and skills.*

*Keywords: Pot throwing, task performance, integrated methods, knowledge*

## Introduction

This article will discuss the question; 'How can an ancient experiential experience such as pot throwing be evaluated in terms of assessing both experiential and tacit knowledge? 'The outcome may be used as a stepping stone to investigate further into the craft process of throwing pots. The structure of the evaluation may also be replicated and applied to other craft processes, providing a vehicle to enable a further investigation into the transferring of knowledge more efficiently and more rapidly when learning a craft skill.
To examine this adequately, an exploration of the pot throwing process as a knowledge experience is required.
Pot throwing has long been in existence. Little has changed for the process except for electrically powered wheels. The material may be more refined, but it need not be. Previously, there has been little research into craft skills and processes, and research now often has the focus on expressive elements.
How the pot throwing performance can be evaluated in terms of assessing both experiential and tacit knowledge and can this be replicated and applied to other craft processes. This problem has been explored by the observation of a small purposively sampled participant potters, throwing a kilo of clay with the design intent of a cylinder pot.
The participants were purposively gathered from clay events throughout England. There was also an element of snowball sampling e.g. when visiting an area to meet with participants, other similar potters were suggested or offered to be participants. The following figure (Figure1) shows the participants engaged in the throwing performance.

**Figure 1: Snapshots of study participants, two female, three male expert practicing potters.**

## Framework and research method

The framework follows a method offered by Professor David Plowright in 'Frameworks for an Integrated Methodology (FraIM)' (2011) which can accommodate both 'qualitative' (narrative) and 'quantitative' (numerical) data sets. Plowright (ibid 2011) builds upon an accepted conventional framework from Creswell (2010), Teddlie (2009) and Arthur (2012) by proposing an 'integrated methodology'. These, he feels, are frameworks to 'structure thinking about research'. (2011 p.3) He has included the use of alternative terms for traditional concepts for example 'qualitative' is termed 'narrative' and 'quantitative' aspects are termed 'numerical' the following figure, Figure 2 shows the section headings in the framework, which this article will be following.

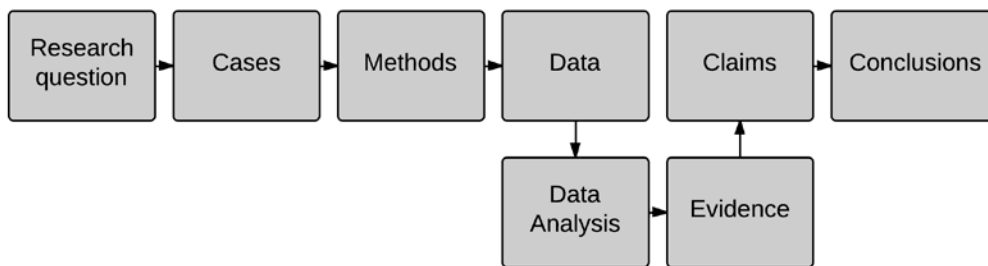Figure 2 shows section headings underpinning the organisation of this article.



**Figure 2: The basic Frameworks for an Integrated Methodology (adapted) (Plowright, 2011 p7)**

The structure as applied to this article is outlined in Table 1, looking at key areas and their application to the article.

**Table 1: Key sections and their application to the article.**

| Key sections | Applications to the article |
|---|---|
| Research question | Acts as the introduction setting the context and outlining theoretical issues |
| Cases | Covers the practicalities of capturing the throwing process |
| Methods | Discusses structure of the data, the mediation of the researcher, the quantitative and qualitative elements involved |
| Data | Outlines the tools used in the collection of the data |
| Data Analysis | Involves discussion of the use of Task analysis |
| Evidence | The data outcomes |
| Claims | How the evidence links to the question |
| Conclusion | Discussion and conclusions and suggestions for future work. |

## Research question

The research question for this article is based on presentation material from the 'Making' conference 2012: 'How can an ancient experiential experience such as pot throwing; be evaluated in terms of assessing both experiential and tacit knowledge?' (Palmer, Torrens & Scott, 2012)

Plowright (2011 p.8) suggests a number of areas might be employed to fully explain the research question; however, for this article two sections 'Context information' and 'Theoretical information' are relevant.

## Context and theoretical information

Archaeological evidence indicates that clay has been used for expression and practical purposes since 8000B.C. Wheels for throwing came into existence around 4000B.C.The knowledge for the use of this technology was disseminated by itinerant potters across Europe (Roux, 2003 p.3). The learning method from master potter by a student lends itself to practical, physical learning rather than just a theoretical understanding. It was a slow process; the itinerant potters arrived, worked and left potteries seasonally. Learning opportunities were intermittent; therefore, the throwing technique took time to master and progress.

In 1940 Leach wrote The Potter's Book (1976 p.66) which defined the essence of the pot throwing craft 'There is nothing quite like throwing in any other craft. Wood, metal, fibre and glass, none of them are so responsive to the touch as clay.' This establishes that the process of throwing is an ancient experience.

Despite being an ancient material, clay is a very modern material found to be 'abundant, inexpensive and environmentally friendly'. (Theng, Bergaya, & Lagaly, 2006 p.1) It is interesting to note that Schaffner refers to the personal responses:

'Clay connects to some pretty basic and base impulses. It practically demands to be touched and shaped. It was one of the first materials humans used to build with.' (Schaffner & Porter, 2009 p.8).

There is a scarcity of critical literature concerning the pot throwing process. Instructional literature can be very subjective and can be confusing, due to conflicting instructions for methods of throwing. There are craft books that mention clay craft, briefly, alongside other craft disciplines. Sennett (2009 p.120) and Risatti (2007 p.14), both refer to potters and their craft, directly in terms of general craft attributes. The literature areas of knowledge and the acquisition of knowledge are more plentiful.

## Experiential Knowledge

'Knowledge can be likened to a suitcase. You know it all, but you have to unpack it, item by item in order to understand how it is packed together' (Pountney, Mulcahy, Clarke, & Green, 2000 p.137).

This anonymous quotation was cited by Pountney et al when discussing experiential knowledge. The lesser known, implicit and tacit knowledge many necessarily become evident as the 'repacking' is attempted. Knowledge, more specifically experiential knowledge, has been the subject of debate in recent times. Barrett (2007 p.116) has considered the work of Dewey who claims that 'all knowledge is essentially experiential'; knowledge gained through or by experience. Niedderer and Reilly (2007 p.85) refer to Johnson and his understanding of knowledge and knowing and his refuting of the term 'Body of knowledge', which he understands as a fixed identity rather than the reflective and enquiring elements of real learning. The following figure, Figure 3, indicates experiential knowledge applied to pot throwing. It considers such points as posture and hand positions when throwing.

**Figure 3: Experiential Knowledge applied to pot throwing demonstrated by a participant.**
Experiential knowledge can be gained through observation and practice Students are
encouraged to put their observed knowledge into supported practice with the clay and the
potters' wheel so as to get a 'feel' for the process. Pountney et al suppose; through practical
experience, that it can take 'millions of repetitive movements to produce a perfect print of the
skill on motor memory' (Pountney et al., 2000 p.76). Therefore, the skill of throwing a pot on
the wheel needs to be practiced a multitude of times for the process to become
automatic.(Anders Ericsson, 2004 p.70).

## *Knowledge*

There are three types of knowledge contained within the term 'knowledge'. Explicit
knowledge being external public knowledge, implicit knowledge is societal knowledge of
knowing how; and, tacit knowledge, internal knowledge of experience.
Explicit knowledge is knowledge which is articulated and is available within the public
domain, societal knowledge contributed to by any number of individuals. Collins, (2010 p.9),
explains that explicit knowledge can be printed, symbols, codes, strings of information that
are widely understood. Explicit knowledge can be accessed through communication and at
human level can be interpreted.
Explicit knowledge concerning the throwing process would include

- materials
- equipment
- structure of the process,
- knowledge of individuals who engage in the process
- books and electronic digital reference material highlighting the process difficulties,
  design elements,

Figure 4 shows the commonly known explicit knowledge elements of the pot throwing
process.

**Figure 4: Participant exhibits explicit knowledge about pot throwing**

Task analysis would contribute to explicit knowledge of the throwing process. Other facets of experiential knowledge are more difficult to access.

If explicit knowledge is out and known, the opposite is tacit knowledge, an internal personal knowledge that has not been explicated Collins, (2010) and Schon, (1991 p.49) agree that this kind of knowledge is about knowing intuitively and that this knowledge is not easily explained. Those portions of knowledge, for example, that an individual has experienced and generally has not the means to articulate to others. This type of knowledge aligns easily with parts of experiential knowledge.

Collins proposes that there are three types of tacit knowledge. Relational Tacit knowledge, (2010 p83), is where knowledge relates to the social life of social activity and relationships, most individuals have unique tactile experience of clay or other malleable material. Schaffner discusses that 'clay is also primal – a medium for the most elemental associations and expressions' (2009 p.8).

The second is Somatic tacit knowledge dealing with tacit knowledge embodied by the human body and brain, this knowledge might be how a person might handle clay under differing conditions too moist, too dry and how to ameliorate the condition, where an individual might instinctively know how to manipulate the clay. This knowledge would increase with experience and understanding of the material.

The third is Collective tacit knowledge embodied from an individual embedded in society, the knowledge that most potters use clay and those who throw pots will use a wheel this could be more ontological rather than biological. It involves the knowledge of social society and is only human due to the need to have special and continuous access to location of knowledge.(Collins,2007 p.261). Brain and body have unique capacities to allow it to acquire tacit knowledge from the world in a way no machine can yet match. Figure 5 shows the three areas of tacit knowledge involved in the pot throwing process.

**Figure 5: Tacit knowledge involved in the throwing process**

It can be possible through the use of video recording to detect and to further separate the complexity of real-time interactions which may be considered for more detailed scrutiny. By using task analysis; a moment may be selected that is considered critical to the overall performance. Stimuli and physical forces acting on the potter can be identified allowing the viewer to relate the stimuli acting on the physical receptors within the potter's body and how the potter responds to the given stimuli.

The following table (Table 3) considers the three tacit knowledge types proposed by Collins (2010) in relation to the project. The table shows the definition of each of the types of tacit knowledge. The context is then outlined followed by the analysis tool completing the table with proposed evidence to confirm the three tacit knowledge types.

**Table 2: Types of Tacit knowledge with application to the project**.

| Types of Tacit knowledge | Relational Tacit | Somatic Tacit | Collective Tacit |
|---|---|---|---|
| Definition | Knowledge within the individual from relationships | Knowledge embodied by human body and brain | Knowledge embodied in an individual |
| Context | Deep personal knowledge of materials unable to be expressed. | Knowledge of materials and process from experience. | Knowledge shared by pot throwing community. |
| Analysis Tool | Perception and response/ Task Analysis | Design heuristics/ Task Analysis/ Perception and response. | Interview/ Task Analysis |
| Evidence | Video observation/ Grip pattern, posture, movement. | Video observation/ Grip pattern, posture, movement/ Interview transcript. | Design tools/ Heuristics (Rules of thumb) / Recorded performance and review. |

The grey area of implicit knowledge is sandwiched in between the societal knowledge; explicit and personal knowledge and, tacit knowledge. It is defined as an area of 'Knowing-

how' knowledge. Sometimes, with careful questioning what previously seemed to be deemed tacit knowledge may be explained; it is then termed implicit knowledge.

Figure 6 shows that implicit knowledge concerns those supportive routines that potters use when throwing a pot e.g. when water is needed to aid the throwing process.



Clay centred
Body posture
- hand in pot
- hand out pot
Water needed
Wheel speed

**Figure 6: Implicit knowledge (demonstrated by participant) involved in the throwing process.**
There is the question of the difference between experiencing an activity in a brief time scale and experiencing the duration required to learn the skills involved in the activity.

## Cases: Sources of data

Cases are explained, by Plowright (2011 p.23) as being sources of data. This draws on work from Hammersley (1992 p.184). The selected data is from an online survey, from observation, semi-structured interviews and the collection of anthropometric data. Such 'cases' of data may equally be placed within methodological aspects of research.

Table 4 shows the method of sampling when selecting participants.

**Table 3: Data source areas**

| Data source areas | Tools | Reasoning |
|---|---|---|
| Sampling strategy | Non-probability sampling | There are a number of ways of making pots. Probability sampling might have resulted in all hand builders. |
| | Purposive (Cohen, Manion, & Morrison, 2007) (p114) | Target throwing potters |
| | Snowball sampling | Potters suggesting other like potters for data capture. |
| Data Source management | Online survey, **Observation**, **Interviews**, (Anthropometrical measures) | |

The choice of data sources has been developed through a series of pilot studies (Blessing & Chakrabarti, 2009 p.114) where data sources have been tested and evaluated for their utility within the study these are shown in Table 5, This table shows the development of data sources

from the first pilot study through to the main study. The selected data sources are well placed within an integrated framework, an online survey, video observation, interviews prior to the performance, post-performance reflections and anthropometrical measures. The focus for this article is particularly on the observation element and lesser consideration to post-performance reflections.

**Table 4: Development of data sources for this study**

| Developed from | | Participants | Data source | | | | |
|---|---|---|---|---|---|---|---|
| | | | Online survey | **Observation** | Interview | **Reflection** | Anthropometrical measures |
| | Main study | In progress | Survey reduced to shorter length but covering similar topics | **2 camcorders placed for best capture of data in the field** | Covers the performance with prompts as needed | **Reviews, actions against design intent** | Stature, upper limbs, hands and digits |
| | Pilot 3 | 6 | Paper survey *Too much time to complete* | **2 camcorders 90°** **Both need to be flexibly placed** | Commentary *Commenting in action can be challenging* | **Review Points raised from performance** | Measurement of hands *Discussion of stature* |
| | Pilot 2 | 2 | Semi-structured interview *Time intensive* | **1 camcorder** **Data was limited to front or side view** | Commentary *Provided data* | | |
| | Pilot 1 | 1 | | **Camcorder and stills camera** **Need like equipment** | | **Performance data reviewed** | |

## Methods

Plowright discusses methodology in terms of degrees of structure and the proximity of the researcher. A higher degree of structure would include closed coding in both observation and analysis. It would also include the use of closed questions in questionnaires. A lesser degree of structure would include open coding and more open-ended questions in a semi-structured interview setting. (Plowright, 2011 p.60)

The proximity of the researcher to the data is raised in terms of 'mediation' ranging from the immediate proximal observation to the analysis of event with a short time scale to more distal analysis of events through artefacts and interviews (Plowright, 2011 p.50)

Qualitative studies fall in the area of humanities and social sciences, as the data is generally in the form of words (from interviews), via images (both still and motion) (of the event) and it is looking to understand people and why they do what they do this includes the use of artefacts (objects). The aim is a complete, detailed description of a phenomenon, an observable event. Themes are noted in interview and observational transcriptions. (Arthur, 2012)

Quantitative, numerical analysis, involves measurements of time, length of throwing performance and the length of individual events within the performance. It involves the measurement of motion.(Arthur, 2012)

There are three methods of data generation suggested by Plowright (2011 p.16),

- Observation, where observations will be made through digitally capturing the throwing performance.
- Asking questions, through an interview both prior to throwing performances and post performances, and;
- Artefact analysis, using the video footage of the throwing performances.

Each method contributes to the overall study of pot throwing performances.

## Data

When Plowright refers to 'data' in terms of generation and discusses the structure of the data, whether it is highly structured, such as a closed question or an artefact to be coded, or less structured in terms of open – ended questioning, where the researcher might apply an more open form of coding (Plowright, 2011 p.61) There is an outline, in Table 6, of how mixed method elements (Creswell & Plano-Clark, 2010 p.2), (Teddlie & Tashakkori, 2009 p.7) are used within this study. Should the methods; utilised in this study; have been purely qualitative and narrative then quantitative elements could not have enhanced the outcome. However, by combining and utilising both narrative qualitative data with numerical quantitative data, there will be a more robust triangulation of the outcomes.

**Table 6: Qualitative and Quantitative methods involved in the study**

| Qualitative, narrative methods | Quantitative, numerical methods |
|---|---|
| <ul><li>Interviews - prior</li><li>Online survey</li><li>**Reflection - post**</li></ul> | <ul><li>**Observation**</li><li>Task analysis</li><li>Biomechanical/ ergonomic analysis</li></ul> |

The following figure shows how both the qualitative (narrative) and the quantitative (numerical) aspects can be placed together to enhance the outcomes. The figure (Figure 7) takes the form of a 3D shape where data collection tools involved with the project are used alongside the terms qualitative (narrative) and quantitative (numerical) have sections. The tools, in the diagram have the capacity to be noted as either qualitative or quantitative or aspects of both. Where perhaps a narrative tool has a numerical analysis applied. The diagram works equally well when considering the degree of structure each tool will have. The diagram design can have generic applications.
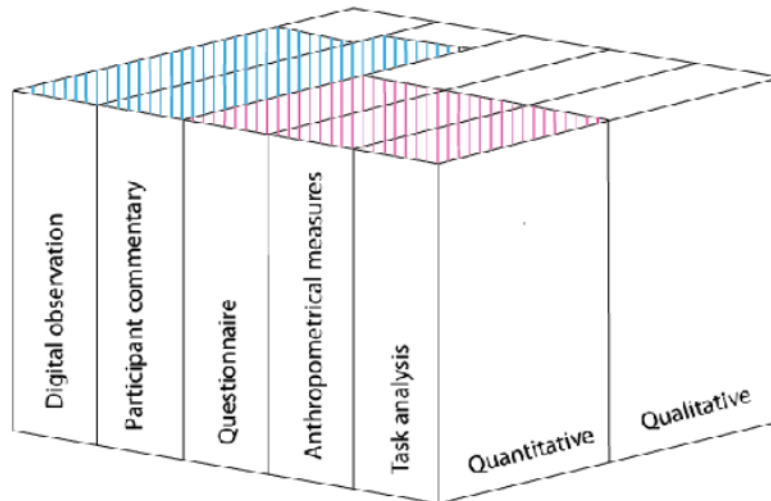
**Figure 7: A sample of the tools utilised with the Quantitative (Numerical) and Qualitative (Narrative) strands. (adapted) Plowright 2011**

### Ethics

This study was conducted to protocols validated through the University's ethics advisory panel.(Loughborough University, 2008)

### Semi-structured interview

A semi-structured interview was used to collect information about the stages within the throwing process so as to compare intentions with actuality. This will then be extended and commented on after reviewing the captured visual data. It will be then reviewed within the analysis phase of the study to compare with both reflected comments and digital observation material.  The advantages of using this semi- structured interview tool are that the same points are raised with each participant, which results in data from prior and post throwing performances. The disadvantage is that combined with three throwing performances, time can be lengthy.

### Video ethnography: observation

Video ethnography is the term highlighted by EDeAN (2007) which describes the method of using video to 'capture versions of conduct and interaction in everyday settings and subject them to repeated scrutiny using slow motion facilities and the like.' Christian Heath and Jon Hindmarsh (2002 p.99) explain the use continuing with the notion that it then can 'provide the opportunity to show the data on which observations are based to other researchers and subject their analysis to the scrutiny by members of the academic community.' Pink observes the use of ethnographic video is having the capacity to be 'defined and redefined differently in different situations' (Pink, 2012 p.23).   The benefits to this study are many. Importantly the process is captured, it can then be viewed many times by the participant, the researcher and the expert community and fragments of action and interaction can be closely scrutinised. The process may be iterative. Close video observation of the throwing performance was completed three times in order to observe pot throwing accuracy and gain insights from the repetitive process, nuances that might not be detected from a one-time observation.

## Data Analysis

Data analysis refers the structure of mathematical, numerical or quantitative analysis or narrative qualitative analysis. The method of task analysis is being utilised in this study. Task analysis of the visual data defines critical moments in the performance. Task analysis is the study of physical work. This practitioner based method is used for the systematic assessment of a task whether an activity of daily living or work –related. According to Stammer and Shepherd (Wilson & Corlett, 1995 p.149) there is no single definition of this tool. The method has many variations that are context driven. Design and ergonomics practitioners predominantly rely on post-analysis of video recordings of a participant performing a task (Wilson & Corlett, 1995 p.174). In some cases the operator of the trial may have to take visual annotations. Whatever method of recording the task, the codifying or breaking down the task into moments of time can be used to:

- Identify events, tasks within a performance,
- Identify frequently occurring postures or grip patterns and;
- Moments considered critical to the successful completion of the task (e.g. changing grip posture or pattern).

The narrative analysis involves using data from the 'review' data collection. The coding is less structured as the participants reflect on their performances. The themes can highlight

- Reflective themes
- Identify common reflections and
- Common terminology used.

## Evidence: Outcomes

For each throwing performance the equipment, a Shimpo potters' wheel fitted with data collection equipment and the design intent, a cylinder pot, remained non- variable. Material used varied with the individual however the amount used remained the same. The environments, environmental temperatures and lighting varied. The equipment involved in capturing the throwing performances two Cannon Legria FS306 Camcorders, and, a Fuji Finepix S6500. All cameras have microphone technology to capture sound with images. The potters' wheel was set up with the personal preferences of the potter. The image recording equipment was placed 1.5m away from the wheel, one camera placed directly opposite the face of the potter focussing on the wheel head area and the other at 90° and to the right of the potter.

The semi-structured interview occurs prior to the throwing performances. The interview begins with the question; what happens when you throw a pot?
The following prompts are offered if needed;

- What is the first event when throwing?
- Followed by?
- And then?
- Finishing with?

This question and prompts establish the performance event intent of the participant. Some participants were brief in their responses whilst others chose to explain fully, they were given no direction as to the length of the answers.
The answers varied from one sentence answers (participants 2 and 3) to explanations from participants.

*Video ethnography*

The observation recordings provided a good source of information relating to the performance of the participants. Both angles in front and to the side complemented each other. Task analysis offered highlighted elements of the throwing process.

There were six defined events;

- Centring;
- making a hole;
- making the base
- making a cone and then,
- pulling the walls generally three times; and,
- finishing.

These were detected within the initial phase of the task analysis. All participants followed a similar pattern of activity. It is when the tasks of the performance are further analysed with biomechanical detail that is rich in data.
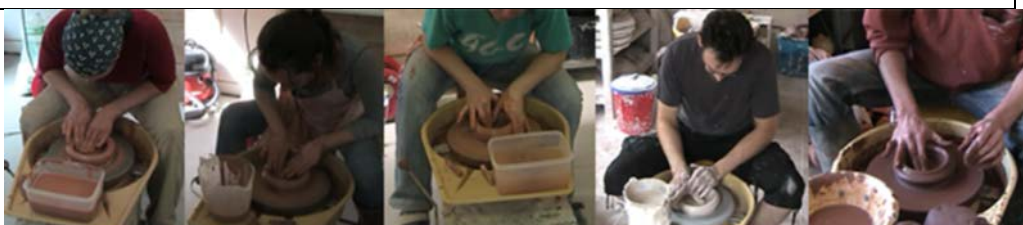
Table 7 outlines the knowledge areas which locate parts of the throwing process. Within the Tacit Knowledge areas there are three sub- areas as discussed, Relational tacit knowledge (RTK), Somatic tacit knowledge (STK) and Collective tacit knowledge (CTK).

**Table 7: The knowledges involved in 6 key points of the throwing performance.**

| | Explicit | Implicit | Tacit | Experiential |
|---|---|---|---|---|
| Centring of the clay | Clay has to be centred to make a successful thrown pot | General posture around the wheel | RTK: Exact posture of each participant. | The experience of throwing clay off centre |
| | | | STK: | |
| | | | CTK: | |
| | Shape of the clay | A ball or cone shape | RTK | Shape of the clay |
| | | | STC:Best shape of clay for which size of pot | |
| | | | CTK | |
| | The body has to sit around the wheel | | R/S/CTK: Knowing how their body can work to centre the clay | Ergonomic characteristics of wheel |
| Making the hole | Books and DVD digital material demonstrate event | The grip to use when using differing digits | STK/CTK: Whether to add water | How deep to make the hole. |
| Making the base | The need to compact the base | Grip methods for compacting the base | CTK: The grip needed to compact the base without piercing. | Amount of pressure used before puncturing base. |
| Making a cone | Instructions on making a cone shape | The stage in the process | STK: Knowing when the clay needs water to lubricate | Knowing whether to make from outside or from inside |
| Pulling the walls | Information about the pulling up part of the throwing event widely available | How many times can a pot be pulled up | STK: Knowing when the walls are refined | The experience of pulling up walls to the required depth. |
| Finishing | The cylinder pot | Knowing when the pot is finished | R/S/CTK: Knowing that the pot has been worked to refinement | Knowing when the point of refinement has been reached. |

## *The throwing performance*

The following figure (Figure 8) shows snapshots of participants engaged in the key stages of their performances of throwing a 1kg cylinder pot.

| Event | Participants |
|---|---|
| Centring |  |
| Making the hole |  |
| Making the base |  |
| Making the cone |  |
| Pulling the walls |  |
| Finished Cylinder pot |  |

**Figure 8: Examples of the key points from throwing performances and participant responses.**

## Throwing observations

The following observations locate three tacit knowledge's Collective tacit knowledge (CTK), Relational tacit knowledge (RTK) and Somatic tacit knowledge (STK).

When centring, most participants cup the clay between two hands, where as one participant uses one hand cupping and one hand over the clay ball. Figure 9 shows two differing hand positions used during centring.

| | | |
|---|---|---|
| Participant chooses to cup the clay for support and for pressure inserting.<br>RTK/STK |  | Participant chooses to exert potentially equal pressure with both hands.<br>RTK/STK |

**Figure 9: Hand positions whilst centring**

The participants make their initial hole for their pot after the clay had been centred on the wheel. They demonstrate two main ways, using the thumbs (digit 1) from both hands and the second way is to use the fingers from the dominant hand.

| | | |
|---|---|---|
| Participant shows using fingers to create the hole.<br><br>STK/CTK |  | Participant uses both thumbs (digit1) to make the hole.<br><br>RTK/STK/CTK |

**Figure 10: Usage of digits to make the initial hole.**

The next stage occurs once the ball of clay has been opened up the consolidation and compression of the base of the pot happens, using varying digits. Some using index and middle finger (digits 2 and 3), some utilizing the thumb (digit 1), this can be seen in figure 11

| | | |
|---|---|---|
| Participant using thumb to compress the base.<br><br>STK |  | Participant using fingers to compress the base.<br>STK |

**Figure 11: Using thumbs or fingers to compress the base.**

Making a cone shape is the next stage in the performance of throwing a cylinder.. Figure 12 shows four differing hand positions used when making a cone.

| | There are four hand positions utilised for making a cone. Using both hands actively and using one hand as support and the other actively. STK/CTK |
|---|---|

**Figure 12: Hand positions used when making a cone.**

When pulling up the walls of their cylinder pots, the participants are shown in figure 13 are making a similar action.

| Participant leans to the right , tucking elbow in for support. Right hand works with the left hand to 'pull' the wall. RTK/CTK/STK |  | Participant leans further to the right, relying on the support of the right elbow pinned for stability. Both hands work together to 'pull' the wall. RTK/CTK/STK |
|---|---|---|

**Figure 13: Pulling up the walls**

## Claims

The claims resulting from analysis; from this study are that potters' need experiential experience in both experiential learning and in actual practical touching experience. The participants exhibited elements of the four knowledge's of explicit, implicit, tacit (relational, somatic and collective) and experiential knowledge.

- The use of the material, the task of throwing a 1kg cylindrical pot was able to be executed with the material used by the participants, who were generally very familiar with the material thrown.

- The choice of material had been made sometime prior to the study as all the participants were practicing potters and had made their material selection to suit their ware. Their choice of clay body created the 1kg cylinder pots.

- Potter, participants were nationally placed within England. They were equal in gender. Stature was balanced with shorter potters of both genders and taller potters of both genders too.

- Machine remained constant as each participant threw on the same wheel, whether they had used the control wheel before. The wheel had a hand attachment so as to allow a choice of control.

- The use of a prior interview about what would happen during the throwing process, combined with a throwing performance and a post review of digital footage have afforded some self-analysis from participants.

- Experiential; the focus of the equipment was good, highlighting the differences in technique and knowledge. It is expected that there would be differences between

expert potters, differences not between the explicit knowledge but in the area of implicit and tacit knowledge in its' three forms.

- Tacit knowledge; the close observation and repeated viewing looking for the tacit knowledge held by the experienced potters holds the key to unpacking intuitive decision making, the unspoken thoughts and knowledge held by the expert potter. Table 8 shows the tacit knowledge observed though task analysis. Somatic embodied Tacit knowledge features in each key point of the pot throwing performance.

**Table 8: Tacit knowledge's observed through task analysis.**

|  |  | Knowledges | | |
|---|---|---|---|---|
|  |  | Collective Tacit | Relational Tacit | Somatic Tacit |
| Centring (Fig. 14) | Potter 1 |  | ▨ (blue) | ▨ (blue) |
|  | Potter 2 |  | ▨ (grey) | ▨ (grey) |
| Making the hole | Potter 1 | ▨ (blue) |  | ▨ (blue) |
| (Fig. 15) | Potter 2 | ▨ (grey) | ▨ (grey) | ▨ (grey) |
| Making the base | Potter 1 |  |  | ▨ (blue) |
| (Fig.16) | Potter 2 | ▨ (grey) | ▨ (grey) | ▨ (grey) |
| Making a cone | Potter 1 | ▨ (blue) |  | ▨ (blue) |
| (Fig.17) | Potter 2 | ▨ (grey) | ▨ (grey) | ▨ (grey) |
| Pulling up the walls | Potter 1 | ▨ (blue) | ▨ (blue) | ▨ (blue) |
| (Fig.18) | Potter2 | ▨ (grey) | ▨ (grey) | ▨ (grey) |

- The following figure demonstrates a possible explanation of how the knowledge's may interact together. (See figure 9)  Tacit and personal knowledge, defined as somatic, relational and collective tacit knowledge is held within the inner section intersecting with each differing and connecting piece of knowledge. This is then surrounded and expanded by 'implicit' knowledge and 'experiential knowledge'. Explicit knowledge being greater than experiential knowledge, implicit knowledge gained from the community and the inner tacit knowledge's  These personal knowledge bases then forms part of; but not the entirety of; explicit knowledge. The edges of the knowledge areas should be more indistinct as the edges of the domains of knowledge are less defined.
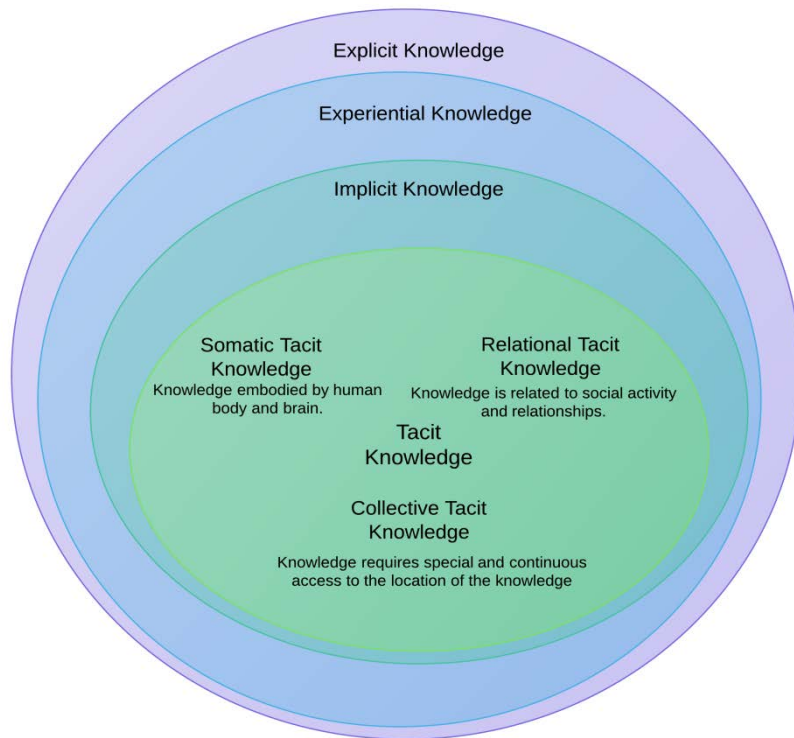
**Figure 14: The relationship and interlinking between the four knowledge's**

- Novice knowledge areas potentially differ from expert knowledge areas in amount and therefore for the purpose of this representation in size. As experience and tacit knowledge is gained the size of the knowledge areas would theoretically expand as knowledge and experience is acquired. The following figure (Figure 15) shows a potential scenario of novice knowledge.
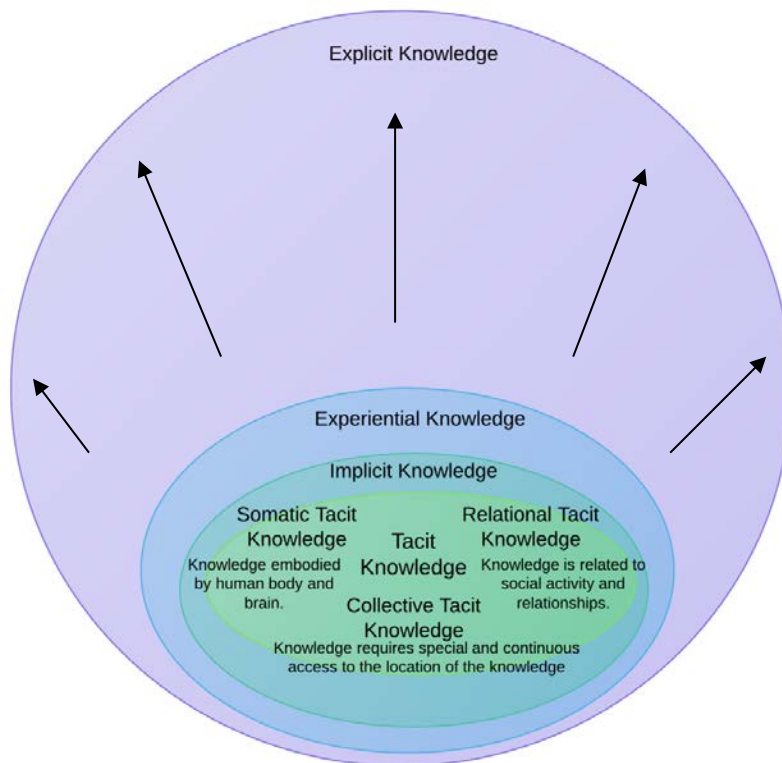


**Figure 15: Novice knowledge**

The claims made have experiential and tacit knowledge points embedded within each point.

## Conclusions

### *Discussion*

The initial question of 'How can an ancient experiential experience such as pot throwing be evaluated in terms of assessing both experiential and tacit knowledge?' has been investigated with a structure of integrated and mixed methods. The 'Framework for an Integrated Methodology' adapted from Plowright has proved to be an alternative structure that can be used for an investigation. The structure has differed from conventional structures in terminology e.g. using 'narrative' rather than qualitative, 'numerical' rather than quantitative and the use of the term 'cases'. FraIM is purely a structure to underpin research. It appears to allow for flexibility between highly structured methods of research and less structured research; therefore, the researcher has the choice to have less structured tools running concurrently with highly structured tools.

The method of video ethnography data capture enables the viewing and reviewing out of 'real-time' so as to discern those tacit points of activity. It has provided a platform where the data could be reviewed by the participant and analysed through task analysis by the researcher. Experiential knowledge appears to be embedded in the explicit, implicit and tacit knowledge matching experience with knowledge. When designing figure 14 to demonstrate a possible construct of the four knowledge's. A consideration of 'novice knowledge' seemed pertinent, because the area of explicit knowledge would remain identical. Explicit knowledge is the external knowledge known to society, therefore would be unchanging until societal knowledge reflects any new learning. Figure 15 shows the difference within the novice tacit, implicit and experiential knowledge areas which would expand with greater understanding of the task and the skills involved in the task. A proposed point, for future research, would concern the 'plateauing' of performance. Experiential knowledge is conceivably gained with each performance in an activity; therefore skill perfection should be acquired. What factors might then prevent acquisition.

The study of the pot throwing performance using the study design has highlighted the need for experiential knowledge when participating in the activity of pot throwing. This experiential knowledge affirms the thoughts of Sennett and Pountney that body muscles need repetition to achieve a task at an automatic level. The participants, do, for the most part throw, more often than frequently, not perhaps on a daily basis due to workshop and workflow restrictions. Therefore the movements needed for throwing a pot are committed to memory. The use of visual data capture of the throwing process has been viewed and reviewed both in 'real-time speed' and in slow motion so as to capture the minute evidence of experiential and tacit knowledge. Where there have been key points; they have been captured by 'snapshot' imaging. The 'snapshot' images have been utilised in noting similarities and differences between such key points as outlined from the 'Evidence' section with the throwing performance.

Through the use of task analysis, tacit knowledge areas have been raised e.g. the use of water within the performance. The question of habitual sprinkles of water at certain times during the performance, the post review process allowed an opportunity to ask if not commented on. The responses fell into the area of tacit knowledge of knowing the tug, the feel of the clay passing at speed past the fingertip receptors, and the amount of water needed to get the feel of the clay back to manipulability.

Figures 9, through to 13; considered tacit knowledge; through task analysis. These figures demonstrated the occasions when the researcher observed the three types of tacit knowledge, somatic embodied knowledge, relational societal knowledge and collective practical

experiential knowledge during the pot throwing performance. Table 10 shows, from task analysis, some tacit knowledge's were interconnected. When analysing, 'making the base, somatic tacit knowledge was identified alone.

The post review proved fruitful in terms of assessing competency knowledge and assessing posture and clay shape. Two participants engaged in a dialogue about the performances being viewed adding to the implicit shared understanding of pot throwing. For development this study might need 'expert' comment to draw out other tacit areas of the performance.

A final claim would be diagrams (Tables 11 and 12) compiled explaining the potential relationship between knowledge, skill and making performance. These tables are designed to be generic, offering a generic contextual map for future study of making and skill. Table 11 shows a generic table of three knowledge's: explicit, implicit and tacit knowledge applied to a making performance

**Table 11: Knowledge applied to a making performance**

| Knowledge | Explicit | Implicit | Tacit |
|---|---|---|---|
| Definition | Knowledge; freely available concerning the throwing process. | Knowledge; gained while interacting with the making community. | Knowledge; affecting the deeply personal. |
| Context | Books, DVD's, podcasts confirming the available knowledge | Aspect of where knowledge is assimilated without knowing. | The physical responses to the material and process that cannot be articulated. |
| Analysis Tool | Video observation of making performance including posture. | Video observation of interaction maker, material and technology during the performance. Task analysis. | Video observation of hand, digit and material interaction. Task analysis. |
| Evidence | The overall performance analysis | Notes on interactions during the performance. | Observations of posture and grip pattern changes throughout performance. |

Table 12 shows a micro aspect, tacit knowledge applied to a generic making performance.

**Table 12: Tacit knowledge applied to a making performance**

| Types of Tacit knowledge | Relational Tacit | Somatic Tacit | Collective Tacit |
|---|---|---|---|
| Definition | Knowledge within the individual from relationships | Knowledge embodied by human body and brain | Knowledge embodied in an individual |
| Context | Deep personal knowledge of materials unable to be expressed. | Knowledge of materials and process from experience. | Knowledge shared by community. |
| Analysis Tool | Perception and response/ Task Analysis | Design heuristics/ Task Analysis/ Perception and response. | Interview/ Task Analysis |
| Evidence | Video observation/ Grip pattern, posture, movement. | Video observation/ Grip pattern, posture, movement/ Interview transcript. | Design tools/ Heuristics (Rules of thumb) / Recorded performance and review. |

Questions arising from this article will need further and different methods of investigation include:-

- The question of whether there is a difference between experiencing an activity in this brief time-scale and experiencing the duration needed to acquire the skills involved would need further and lengthy study.
- Further validation of the methodology and associated methods to deliver a useful framework for the generic evaluation of knowledge and skills within a given craft or other practice-based activity.
- How these outcomes and methods may be applied within a teaching and learning environment.

The framework for this investigation is applicable to throwing pots and assessing the performance through experiential and tacit knowledge. This method could be applied to other craft areas to facilitate the acquisition of the skills needed to perform craft actions.

*Conclusions*

Framework for an Integrated Methodology (FraIM) has shown it is a flexible, alternative research method structure. The use of digital visual capturing has been positive in two ways. Firstly the digital visual data of a throwing performance has been viewed and re-viewed both in real-time and in slow-motion. Secondly the digital visual data has had 'snapshots' frame by frame of key points in the throwing performance, which highlight similarities and differences. Experiential knowledge is important when learning a set of skills for a craft performance so that successful movements can be repeated, committed to muscle memory so as to become automatic. Tacit knowledge points were noted when using the tool of task analysis. This showed detail through task events. The post review proved fruitful in terms of assessing competency knowledge and assessing posture and clay shape.

Generic knowledge maps, compiled for the three knowledge's and for the tacit knowledge's, explain the potential relationship between knowledge, skill and making performance. These tables designed to be generic, offer a contextual map for future study of making and skill. Therefore the pot throwing process has shown to be evaluated in terms of experiential and tacit knowledge.

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