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Reviewed Article:

Let the Chips Fall Where They May: Evaluating the Impact and Effectiveness of Video Resources for Knowledge Transfer in Flint Knapping

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Knowledge and know-how: The 'how' of knowledge transferal continues to be a question in prehistoric archaeology, especially in relation to early hominid development. Has the transferal process been greatly affected by our so-called modern world and its technological

advantages? Have the current modes of communication enhanced and eased the transfer of knowledge? As visualization is a key element in the transferal process, has, or can, live-streaming videos and or DVDs augment and/or replace face-to-face instruction? Using flint knapping as a platform for exploration, the question "can prerecorded video lessons be successful in the transfer of knowledge of flint knapping and assist in know-how development in the craft" is addressed in this paper. 28 prerecorded videos (consisting of over 30 hours of running time), both in the form of DVD and internet streaming sources, are placed head-to-head, contrasted and scrutinized against a standardized criterion in order to determine their efficiency in transferring knowledge.

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Introduction

Once a process is discovered, how is knowledge of it preserved and then transferred to others? With all our advancements in technology and visual media (DVDs, internet, smart devices, and so forth) do we truly have an advantage over our ancestors in the pursuit and the transmission of knowledge? The fact that we are here today bears testament to the knowledge transfer techniques used before the advent of visual technology. This work investigates knowledge transfer and modern methods of transmission, particularly that of video media, in learning the art of flint knapping. How effective is this medium as compared to direct teaching? Can visual media act as an effective substitute for face-to-face instruction?

Before attempting to unravel the prehistoric and modern transmission of knowledge in the art of flint knapping, a few terms must be defined. What is "knowledge" in regard to this process, and how does this knowledge transform into "know-how"? The term "*connaissance*" or "knowledge" is used to define the mental representation of forms (templates) and materials, as well as a register or log of motions or gestures (muscle memory) and their outcomes. "*Savoir faire*" or "know-how" defines the reflections, decisions, evaluation, programming, and execution of those gestures (Pelegrin, 1990, p.118; Olausson, 2012, pp.213-215). In essence, these terms define the process of taking knowledge or learned behaviors from a mental state to a physical form.

Regardless of the advancements in technology, how effective are they in knowledge transmission? Do the advancements actually represent something better?

We have seemingly limitless resources, possessing the ability to accommodate communicative transfer, especially visually via DVDs and internet streaming. These sources are particularly useful as a visual image is provided, which is in most cases, enhanced by

audio. Mental and visual representation is crucial in the transfer of knowledge and its subsequent transformation into know-how. This is evidenced by flint knapping experiments used to determine if a child's or novice's flint knapping "signature" could be identified in the lithic remains. During this exercise, adults and children, with no prior flint working experience, were given limited visual and verbal instructions and then asked to replicate a series of Mesolithic artefacts. Success was limited (Sternke and Sorensen, 2009, pp.720-721). In yet another study, 24 participants without previous flint working experience where divided into two groups; one which received verbal/visual instructions and feedback, whilst the other was expected to mimic the demonstrator's actions without verbal instruction. Although little separated the quality of produced bifaces, the material produced by those who received verbal instructions "displayed evidence of key concept acquisition" more readily than the material produced by those who copied gestures as evidenced through the debitage attributes (Putt, *et al.*, 2014, pp.102-104). The importance of visualization is further reinforced by young chimpanzee mimicry of simple tool usage (Sanz and Morgan, 2013, pp.162-163). According to the study young chimpanzees do not merely imitate the actions of adults but observe and implement different combinations of what they have seen and deemed successful (Moore, 2013, p.889). The previous examples illustrate that visualization in itself is a successful method of knowledge transfer, however, its ability reaches a new level of success when reinforced verbally. Both methods are greatly enhanced through the inclusion of the other (Lombao, *et al.*, 2017, p.9). The transfer of knowledge, accordingly, appears primarily reliant upon visualization which is further facilitated and maximized when combined with verbalized instruction. Therefore, with the availability and quantity of visual media available, video should provide a readily accessible conduit for the transfer of knowledge…but does it?

Prehistory to Now: is there a Difference in Knowledge Transfer?

The objective of this exercise is to answer the following: Can prerecorded video lessons successfully transfer the knowledge of, and assist in know-how development in flint knapping?

In the course of this project, the focus is placed upon DVD and internet video resources as a mode of transference for knowledge in the study of lithic technology and flint knapping as evaluated by the author (See Appendix 1). Today more than ever, flint knapping videos marketed as "instructional videos" are readily available for purchase or instantly accessible via one of the internet video hosting services.

How was knowledge transferred from person to person, and from generation to generation during humankind's beginnings? Much has been postulated on the methods of knowledge transfer, or pedagogy, in prehistory, but it is all supposition based upon observation of artifact types that are repetitively reproduced, without change, over generations (Apel, 2001, p.84; Tehrani and Riede, 2008). Is this lack of variation in design over time due to an ethos of "if it is not broke, do not fix it", or is it truly evidentiary proof of a consistent mode of

knowledge transference? One thing is for certain, and that is that knowledge had to be transmitted consistently over the millennia. Redundancy in design over long periods of time is proof for continuity in knowledge transfer. The question is how it was accomplished in the early Paleolithic when it is thought that no means of verbal communication existed or is it that verbalization is not a pivotal ingredient in this transfer process (d'Errico, *et al*., 2003).

Recalling earlier paragraphs, verbal communication greatly enhances the conveyance of a visual presentation, although a visual presentation by itself can be a legitimate means of transfer. This observational learning or silent transfer would most likely have been the starting point for knowledge transfer in the Paleolithic. Evidence for this task oriented replication , or mimicry of creation can be observed in the work done with bonobo (*Pan paniscus)* chimpanzees (Schick, et al, 1999). The chimpanzees were able to begin mimicking demonstrated flint breaking movements after a relatively short period of time in which they used the resultant sharp edges to cut a string which secured a food incentive/reward. Eventually the chimps began to display independent modification of these actions into new approaches in the production of a sharp edge, such as throwing one conchoidally, and fracturing material at another to initiate a fracture (Schick and Toth, 2009, pp.270-271). Although they were consistently able to break the provided lithic material, the resultant material produced does not demonstrated true comprehension of the knapping process or its concepts in which to produce controlled flakes as evidenced in the earliest of Paleolithic technology (Moore, 2020, p.12). Conversely, wild bearded capuchin monkeys (*Sapajus libidinosus*) consistently select conchoidally-fracturing lithic materials in which to create simple flakes and producing a dust (containing trace minerals) for supplemental intake. The hammerstones, cores and resultant flakes produced closely resemble objects produced by Lower Paleolithic hominids (Proffitt, *et al*., 2016, p.1; Moore, personal communication, 2020). Regardless as to whether experimental work with primates demonstrates evidential insight into developing and transference of technological processes in the Lower Paleolithic, it, as well as observation of wild primates, does illustrate that visualization alone can successfully pave the way for the transfer of knowledge albeit in the form of observational learning/mimicry (Sanz and Morgan, 2013, pp.162-163). Far from being all-inclusive, studies such as these are essential in providing insight into possible early hominid behaviors, as without evidentiary proof, these trials show the most likely pathways in the earliest transfers of knowledge. This same observational learning is evidenced in modern hunter/gather groups in the Congo. The principal investigators created a standardized coding sheet in order to rate types of teaching during transfer events which ranged from natural pedagogy, practice, to generalized play (Hewlett and Roulette, 2016, pp.5-6). Herein we see that the role of societal interactions, no matter how minute, can be aimed at transferring lifeways, encoding children with simple to complex skills on a daily basis. Similar interactions, which likely had their beginnings in the Early Paleolithic, facilitated knowledge transfer through simple gestures and repetition/play (Assaf, 2019). The key aspect that underpins Paleolithic knowledge transfer is the prolonged and continued creation of specific lithic tool assemblages. As cognitive ability

increased, so did the level of toolmaking (Domínguez-Rodrigo, 2018, p.1). The only way for formal tool-types, such as the Acheulean hand-axe, to exist from the Late Lower Paleolithic until finally surrendering its dominance as the tool of choice in the Middle Paleolithic (De la Torre, 2016, p.1), is the presence of a successful and repeatable method of transfer of knowledge.

The transfer of knowledge kept pace with more complex technologies emerging in the Middle Paleolithic which expanded through the Mesolithic, and culminated in the Late Neolithic with the emergence of some of the most technically advanced tool types ever seen such as the ripple flaked "Gerzean" knives of Egypt (Skarzynski, 2017, pp.213-222; Kelterborn, 1984, p.450), the extremely large *livre de beurre* blades cores of France (Linton, 2016, p.236; Pelegrin, 2006, pp.63-66), and the flint daggers of Denmark (Lomberg, 1973; Stafford, 1998; Vang Petersen, 2008, p.126) (See Figure 1). The increasingly complex transfer of knowledge coincides with the appearance of industrial-sized workstations, with family groups, or possibly small communal groups, in control of disseminating the knowledge (Stafford, 1998, p.347; Barrowclough and Lister, 2004, pp.83-84; Apel, 2008, p.106; Olausson, 1997, p.272). The formation of apprenticeships developing alongside these specialized work centers is a strong probability (Olausson, 2000, p.122). By safeguarding the more technical, or secret or technical aspects of processes (preserved through possible apprenticeships), then demonstrating only the finishing aspects of the process in public, the keepers of this technology asserted ownership of that knowledge (Apel, 2001, p.41). Through this control they were regulating the flow of knowledge (Hayden, 1998, p.22; Olausson, 1997, pp.272-274). The possible existence of apprenticeships, serving as transfer paths and repositories for knowledge as well as stages for know-how development, would have continued to expand as an acceptable means by which to recruit and train young people in a trade or craft. Although the topic is debatable as it is difficult to see nontangible ideas or concepts in the archaeological record, the establishment of some type of highly successful knowledge transfer had to have existed for advanced flint working to have continued as long as it did. An example for this is evidenced in the prolonged and continued production of flint daggers in Scandinavia for over twenty-four generations (Apel, 2008, p.1). Although the individual flint workers' ability is a factor, a consistent pathway for the flow of advanced technological knowledge in flint dagger production had to have existed for their creational longevity. The manner in which knowledge is transferred continues in a similar manner today in both in formal and informal settings. Add to this the availability and accessibility of printed publications and video resources which have facilitated and enhanced the transfer of knowledge (Kumah, 2015, p.1)

Foundational knowledge pathways for this craft have also expanded; DVDs, internet videos, books, and short-term courses with personal instruction or via internet streaming (See Graph 1). One can even purchase flint knapping courses online, engage in video-media based correspondence courses, and access instruction via live video lessons from individual instructors and institutes online. Many of these pathways were unavailable until relatively

recently. Each of the aforementioned methods involve the employment of visual and verbal communication except for books. Books are great references after foundational knowledge has been acquired, even more so when accompanied by generous visual representations, but can cause interpretational issues especially if used in foundational skill acquisition. Descriptive prose provided by early explorers and ethnographers often serve as the starting point for investigations into prehistoric technologies.

In a heuristic approach these descriptions often cause confusion and interpretational issues as most were written by observers unfamiliar with the technology being documented. Even the most skilled modern prehistoric skills practitioners/experimental archaeologists have difficulty using books alone for knowledge acquisition and technology interpretation as these processes are difficult to accurately describe (Coles, 1979, p.163; Titmus and Woods, 2003, pp.72-73). This is comparable to building most modern DIY (do it yourself) furniture utilizing the very vague instructions normally provided. Imagine completing this DIY project with only vague verbiage to guide you and no illustrations for each step. Success is achievable but not at the same rate or with the same outcome as when there are visual aids, or someone experienced to guide you through the process.

No matter how advanced technology becomes, the methods of transfer remain essentially unchanged. Regardless of time period, visual and verbal instruction, independent or merged are successful to varying degrees in the transference of knowledge. With visual and verbal communication meeting two of the three crucial modalities of knowledge transfer (See Graph 2), and with video media able to provide these two as well, the transfer of knowledge would appear easier. The question is whether recorded visual media is an effective means to acquire knowledge and facilitate know-how development?

Why Flint Knapping Today?

Most of what has been gleaned in the production of prehistoric artefacts of stone has been derived from deciphering the *chaîne opératoire* utilized in their creational processes. As most of the knowledge base in flint knapping was largely unknown to academia (other than ethnographic accounts of current stone tool creating/using societies, and of course in North America, the work with Ishi in the early 1900's) artefacts were studied to decipher their operational chain and parent technologies - the knowledge aspect - and then the know-how had to be redeveloped through repetitious practice.

From as early as the 1830s,scholars dabbled with flint knapping both in the U.S. and Europe, to varying degrees. Most early flint workers were unscientific in their approach, although the early work of Sir John Evans in the mid-1800's was a more serious attempt at deciphering and understanding the manufacture of prehistoric lithic objects. His initial work with flint was primarily driven by the need to show that flint objects found with extinct megafauna were the creation of early humans and not the product of nature (Lamdin-Whymark, 2009). In the

process of doing so, he began to be able to understand and interpret stone tool technology from around the world (Evans, 1897, pp.14-54) However, it was not until the 1960s that true scientific experiments with the creational processes and usage of flint artefacts were conducted by Don Crabtree in the U.S., and Dr. Jacques Bordaz in France (Johnson, *et al.*, 1978). Around this same time, Coles landmark books (Coles, 1973; 1979) concerning the importance of experimental archaeology were published underscoring the need for controlled and unbiased experiments in academia to determine the creation and uses of all prehistoric quotidian use objects. Such experiments are vital as they can reveal the small, vital details previously lost in the creational process, which further grant greater insight not only into artefact creation, but also into their probable uses, wear and lifecycle, as well as allow the elimination of erroneous creational and utilization theories concerning these objects. It is easy to deduce why academics would desire greater knowledge and understanding of the creational processes involved in lithic technology, but they are not the only ones interested. Hobbyists, practitioners of living history, bush crafters, as well as amateur or avocational archaeologists all have their own reasons for pursuing the art of flint knapping today. Can video media be successful in providing a pathway for foundational knowledge development or means to advance basic skills in flint knapping?

In order to begin exploring this subject in greater depth, and to set the stage prior to undertaking this project, six modern lithic crafters/artists (three American and three Scandinavian; two with ten years or less experience, two with greater than twenty years, and two with approximately thirty or more years of experience) of ages ranging between 21 to 62 years of age were asked the following basic questions, and their answers were recorded before the rest of this study was undertaken.

1. When did you begin flint knapping?
2. What was your interest in learning flint knapping?
3. Did you immediately seek someone to learn from or did you "experiment" with knapping on your own first?
4. Did any of your knowledge acquisition come from videos; either DVDs or internet sources?

Note: All the responses were garnered through personal communication with the participants who will remain anonymous.

In examining their answers, their dedication and continual personal commitment in learning this craft becomes very apparent. All but two of the crafters/artists began knapping before 1991 (See Graph 3). This is important to note as the accepted “birth date” of the World Wide Web and the internet as we know it was 6 August of that same year (Bryant, 2011). Two of the participants primarily utilized visual media with the internet as their biggest, and/or first influence and teacher for their foundational development. They are both currently under 25

years of age (See Graph 4). The remaining four began their craft in the period from 1979 to 1997. Although they have all accessed videos, it was much later and not during their foundational development in the craft (See Graph 5). All of the flint-workers questioned started their craft independently, to an extent or another, until a mentor was found shortly afterward.

Additionally, the two participants who utilized video media for their main source of knowledge acquisition reported that even after engaging with an experienced mentor they continued to rely heavily upon video media as a primary source of knowledge for continued reinforcement of foundational principles, and for the introduction of new ones. One participant reported “internet only” instruction and independent practice for almost two years before meeting another lithic artist.

These questions were created to examine a diverse demographic in a small sample size. The intent was to examine knowledge transfer in the formative period of the participants and to determine how much, if any, influence video media had in this formation, and if that transfer was successful (See Figures 2, 3 and 4).

How was the Data Collected?

In order to objectively evaluate the transfer of knowledge in currently accessible flint knapping instructional video resources, a set of standardized evaluation criteria were developed to assess each video. Calling upon the author’s advanced background in flint knapping, education and training, and audio/visual communication (See Appendix 1) a checklist was devised which would allow for consistent and unbiased evaluation of each video presentation. The checklist was divided into groups of related topics, as well as audio/visual considerations. As indicated previously, and to further strengthen this line of inquiry, a series of questions were presented to six modern lithic crafter/artists and their responses were used to evidence various sections throughout this exercise.

After scouring the internet to compile a list of commercially procurable flint knapping videos, 33 currently available for purchase from approximately 16 presenters/lithic artists were found. The author is also aware of additional videos which were formerly commercially available in VHS format but are no longer available. Of the 33 commercially available DVDs currently on the market, 14 out of the available 33 flint knapping DVDs were deemed relevant for use in this study. The selection was primarily based upon availability, subject matter, and targeted demographic (examples were chosen that were marketed and described as being created for both beginner and advanced audiences, as well as subject specific). To contrast the commercially available DVDs, 14 internet-based videos of similar content were selected on the video streaming host YouTube. YouTube allows the user to select how videos are displayed or filtered. The on-line videos were selected by their view or hit rates for the past year. A period of one year was selected as it was the greatest length of time allowed by

YouTube to filter by. A twelve-month period allowed for the accumulation of views/hits. These videos range from beginner to advance in level and are normally shorter in duration, covering specific subject matter (if comprised of several segments, all applicable segments were viewed and counted as one video). An important note concerning the on-line videos: YouTube filters top viewed videos by the region of the user's Virtual Private Network, or VPN, to determine which videos are the most highly viewed videos. Therefore the 14 videos that were utilized for this project are the top videos based on a VPN from the United Kingdom. Thus, the 14 videos accessed herein are different than those accessed from an American or other regional VPN.

Making the Point

The rating system is based upon a modified Likert scale (a three-choice rating scale with corresponding numerical values) (Harpe, 2015, p.838). The evaluation criteria utilized a standard set of questions falling under the headings of: Introduction, Audio/Visual Considerations, Technical Issues, Overview, and Summary of Content. Questions listed under each of the headings were scored by selecting the response that most closely represents that sections content. It should be noted that questions number 3 and 10 on the evaluation sheet are not directly connected with knowledge transfer but are important archaeological resource preservation considerations (See Appendix 2). The ratings are Inadequate, Meets, or Exemplary, or Yes, No, or N/A. For evaluation and scoring; Exemplary/Yes = three points, Meets = two points, Inadequate = one point, No/Not Applicable (N/A) = zero points. An aggregate score for the video is determined out of a total of 60 possible points (See Appendix 2). All these considerations are utilized when determining each video's overall success in the transfer of knowledge. After an overall rating is determined for both formats combined (DVD and internet), the media is further subdivided to reveal ratings against media of similar content. Analyzed categories are:

1. Media
    - Overall
    - DVD
    - Internet
2. Level of Instruction (any media deemed appropriate for all levels was counted in each category).
    - Beginner
    - Intermediate
    - Advanced
3. Single or specific type (videos created to explore a specific artifact form, or technique were not rated in areas that were not applicable as they are specialized and not "general"

videos)

The chips have Fallen - Results / Analysis / Discussion

After viewing almost 30 hours of flint knapping media it was time to sweep up the debitage, put away the tools, and look at the results. After each graph a short summary will follow. The Abbreviations Key for the tables can be found in Appendix 3.

The Overall Rating graph (See Graph 6) charts all 28 videos viewed. This is a mix of purchased DVDs and Internet sources. Out of the 28 videos (See Graph 6), five scored over 40 points out of the total 60 points available. The top score was 52 and the lowest was 11 points. The mean score was 27 points. The graph also indicates that video source (DVD vs internet) had little effect on the final scoring; however, the top five videos were all commercially produced DVDs.

Looking ahead at Graph 7, the DVDs were separated from the internet sources. The highest score was 52, the lowest was 18 points with an average score of 35 points. Is the seemingly high average due to the proclivity of those producing commercial DVDs consistently used professional recording equipment, multiple angles, set lighting, scripted information and multiple and or alternate takes, editing etc., whereas most individual posters of online streaming videos primarily conduct their recording utilizing their cellular phones, or hobbyist level recording equipment, record the entirety of their segment in a single take situated in their normal work area with natural lighting, and with little to no preparation or scripting? Most of the same options afforded the commercially produced videos, to a degree, are available to those posting their own recordings online but the majority appear to choose not to. In several instances this detracted from the information provided.

In Graph 8, internet media, things change dramatically. Out of 15 videos the average score was only 18 points. The highest score was 37 out of 60 total points, and the lowest was 9. Audio-visual and technical considerations were almost equal. Unlike the DVDs, it really came down to the presentation of the content of each video. Almost every video was shot in a single take. Additionally, there was no correlation between number of views and total score. Ironically, the video with the lowest score had the highest view rate of almost three million hits.

The results were further divided into “Levels of Instruction”. The levels were determined by the author based upon the overall content of the material presented. Many of the videos briefly covered some of the same subject matter, but it was the overall theme that decided the skill level rating. In many cases, videos encompassed more than one level (See Graphs 9, 10 and 11). This is a mix of internet and DVD sources.

Beginner level – to qualify as belonging to this level the video had to cover the very basics of flint knapping. Fracture mechanics, basic reduction strategies, safety, and so forth, from a

basic level of understanding. Any video that did this as well as covering more advanced information was still rated as beginner, beginner to intermediate, or all (all encompassing). Of the 15 videos rated as beginner, the top score was 52, and the lowest was 15, with the average of 31. Of the 15 beginner videos, seven were commercially produced.

Intermediate level – To be placed into this category the video must display a level of instruction beyond the basics: more advanced fracture mechanics and platform preparation, and so on. 12 videos fell into this category with the highest score awarded 52 (rated as All levels), the lowest score was a 9. The mean score was 27.

Advanced/All level – To be rated in this category the information contained had to surpass that of an Intermediate resource. Advanced techniques included individual platform isolation, patterned pressure flaking, indirect percussion used for specific techniques and/or advanced level replications. There were twelve videos in this category. Seven videos were rated as Advanced, one was rated as Intermediate to Advanced, two as Beginner to Advanced, and two as All. 52 was the highest score, 11 was the lowest with an average of 30 points.

Graph 12 covers the final rated category for videos of which instruction was for a Single or Specific Type of artefact. 17 videos fell into this category. The highest score was 41, the lowest was 11. The average for the 17 videos in this category was 23. Seven of the 17 videos were commercially produced DVDs.

Sweeping up – Conclusions and Future Work

At the start of this paper the question posed was “can prerecorded video lessons be successful in the transfer of knowledge and assist in know-how development?”. In the course of investigating this question the following was discussed: how knowledge (*connaissance*) and know-how (*savoir faire*) are transferred and/or developed, possibilities of how transfer occurred and evolved in prehistory, and finally, knowledge transmissions in modern flint knapping.

After examining, scrutinizing, and evaluating the resources, it can be concluded that it is indeed possible to transfer knowledge through prerecorded video. The requirements for knowledge transfer do not change regardless of method used; video provides the optimum combination of simultaneous audio and visual input. Coles (1979, p.163) discusses the difficulties of explaining flintknapping techniques via prose and argues that this is why films and/or video are so useful for students and others. Each video, regardless of format, has the possibility of transferring knowledge to the viewer as effectively as working with a mentor. To some degree video media possesses the potential to greatly enhance the viewer’s knowledge assimilation as they are readily-accessible and allow repetitive reference to concepts as often as necessary to reinforce key ideas, whereas access to an experienced knapping mentor may not be possible whenever required. Does this outweigh in-person instruction and knowledge

acquisition through face-to-face instruction? An instructor or coach can diagnose the student's problems, fine tune techniques, and give instant feedback, this a video cannot accommodate. Whether working with an instructor or watching an instructional video, a concept or principle which is introduced must then be practiced thusly converting the knowledge acquired into know-how. Only after knowledge has been gained and reinforced through application and repetition, can the development of muscle memory then be ingrained and techniques truly, and fully understood. Dedicated practice and tenacity are also keys to success. This is evidenced by the questionnaire participants who relied solely upon the internet for foundational development, especially the individual who only had the internet and self-practice for over two years. He is now a very accomplished lithic artist.

None of the videos reviewed addressed everything completely, but some covered items more thoroughly than others. Safety was discussed in many of the videos, although it was never broached in the viewed Advanced or Single/Specific type videos. This can be attributed to their creation intended for an advanced audience and not targeting novices. Despite the intended audience level, safety should be paramount and always mentioned. Additionally, none of these videos addressed the collection of materials from archaeological quarry sites, or utilization of, or reworking of ancient artefacts. Again, and although not an influencing factor in the transfer of knowledge, it is still of paramount importance in the preservation of archaeological resources. The ethical considerations of signing modern lithic creations was addressed in only one of the video's reviewed. This should be a topic in all videos as unsigned, newly created objects can lead to a "tainted" archaeological record. Another topic little covered but also of paramount importance is the disposal of debitage created during modern knapping activities. This is as much of a concern as unsigned and newly created lithic object. The debitage created must be disposed of properly and in a manner which consistently identifies it as being of modern production and not the result of prehistoric lithic activities. Terminology misuse was noted to some extent in all the videos. Out of the 28 videos scrutinized, only one instance was observed to carry incorrect information (the misidentification of a specific artefact type). Despite such minor discrepancies, each of these videos can be successful, to an extent, in transferring knowledge. Although beneficial for beginning level practitioners, the author believes that video lessons can be of even greater benefit to Intermediate to Advanced practitioners as they have already established a mental visual reference collection, and an accumulation of knowledge and know-how which facilitates this transfer more effectively.

There are many areas that could have been addressed in this paper but for various reasons were not. The following are areas for future exploration:

1. Key ingredients necessary for successful knowledge transfer in video media.
2. Silent transfer. Experiments involving groups from beginners to expert. Can simple to complex concepts be transferred only visually? What are the rates of success?

3. Advanced silent transfer with advanced flint-knappers? Complex techniques utilizing videos and or demonstrations. What is the success rate of advance participants?
4. The use of prerecorded videos with novice knappers. Two groups of participants would both watch videos of simple flint working: one group video only, one audio and video. Have both groups then be instructed in person on the same exercise allowing them to ask questions. All results could then be compared and contrasted for gauging effectiveness.

Whether today or 1.5 million years ago, the transfer of knowledge in the lithic arts is a challenge. Despite our technological advances it is only through dedicated and repetitious practice that the knowledge gained can be converted into know-how. With the wide array of videos and the ability to access the media at a whim, learning the “art of the ancients” has never been so easy. The only question remaining is, “what are you waiting for?” Grab your tools, turn on your computer or television, and - with pun fully intended - get cracking!

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Attachment(s)

Appendix 1. Author’s Bona Fides (129.28 KB)
Appendix 2. Lithic Technology Video Media Rating Sheet (172.71 KB)
Appendix 3. Abbreviations Key for Videos (Graphs) (131.87 KB)
Appendix 4. Other Bibliography (183.35 KB)

Keywords flint knapping
methods & techniques
teaching
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FIG 1. A-EGYPTIAN PREDYNASTIC RIPPLE-FLAKED GERZEAN KNIFE. GERZEAN KNIFE PHOTO BY AND USED WITH PERMISSION FROM PETER BOSTROM/LITHICS CASTING LAB 2020. B-LATE NEOLITHIC LIVRE DE BEURRE BLADE CORES GRAND PRESSIGNY REGION, FRANCE. PHOTO BY JOHN KIERNAN 2020.

FIG 2. MODERN MASTERPIECES IN FLINT. PHOTOS BY AND USED WITH PERMISSION FROM SOFUS STENAK 2020

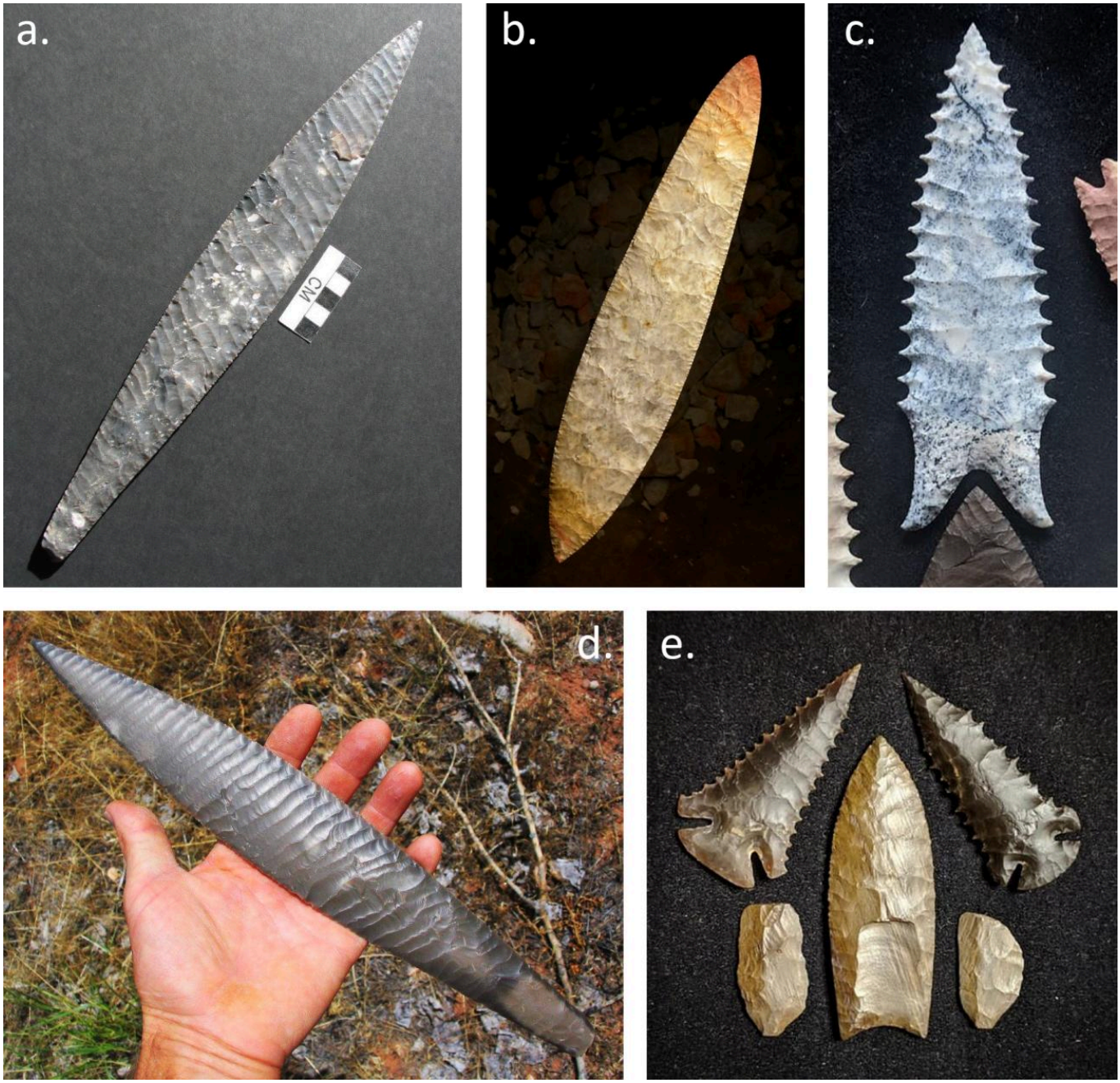
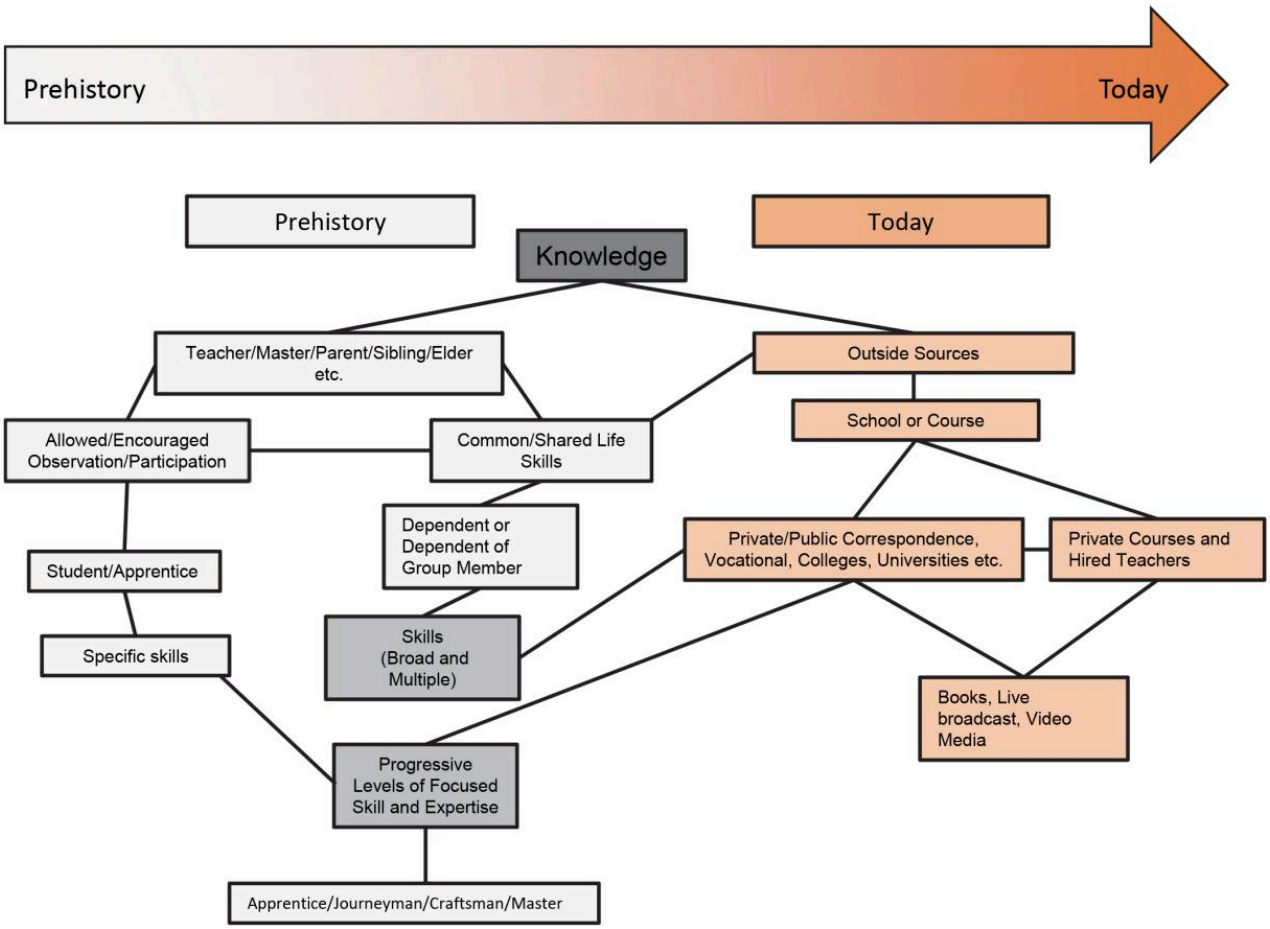
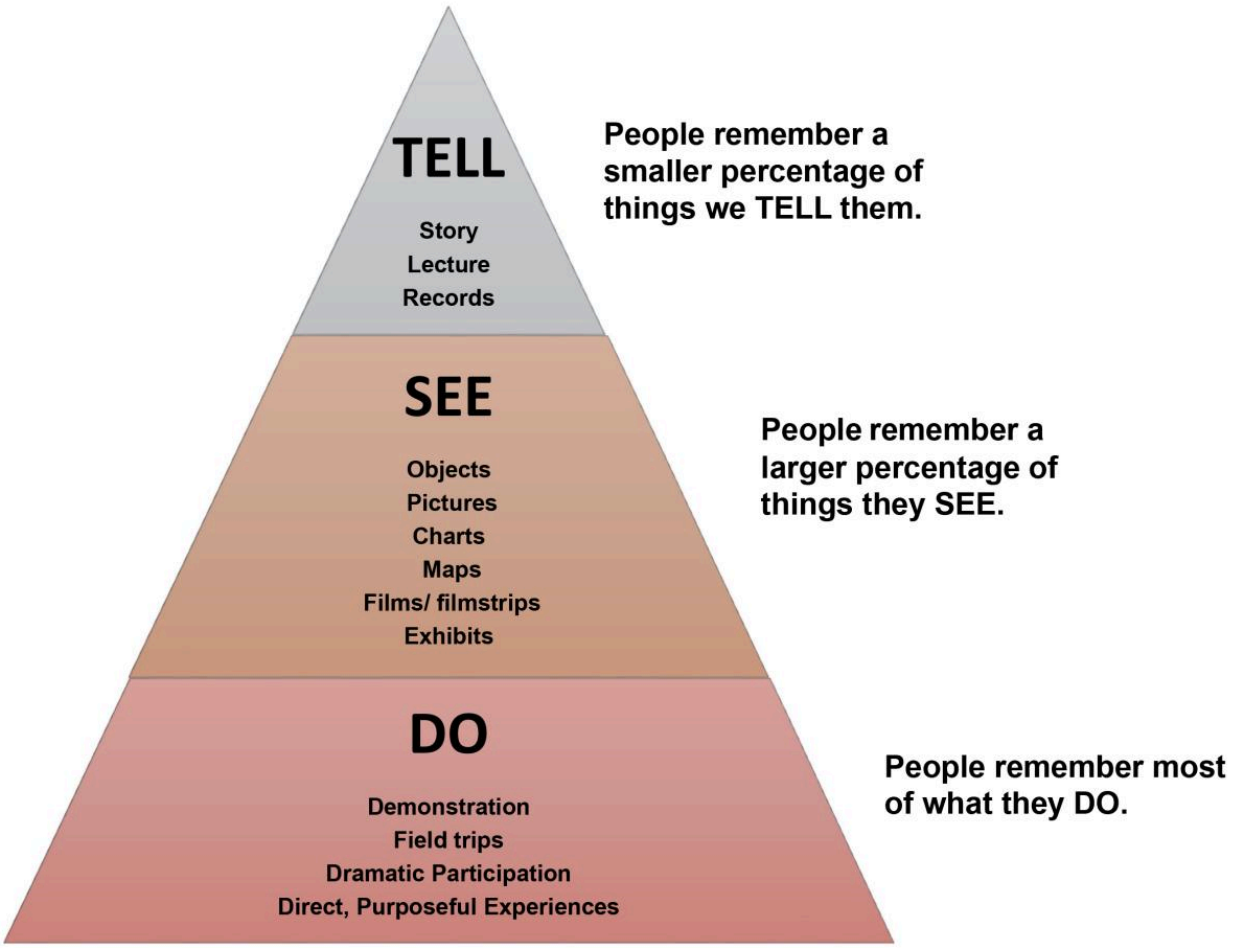


FIG 3. MODERN MASTERPIECES IN FLINT AND OBSIDIAN. PHOTOS BY AND USED WITH PERMISSION FROM: A&D-GREG NUNN 2019, B-WOODY BLACKWELL 2019, C&E-DOUGLAS ALCORN 2019

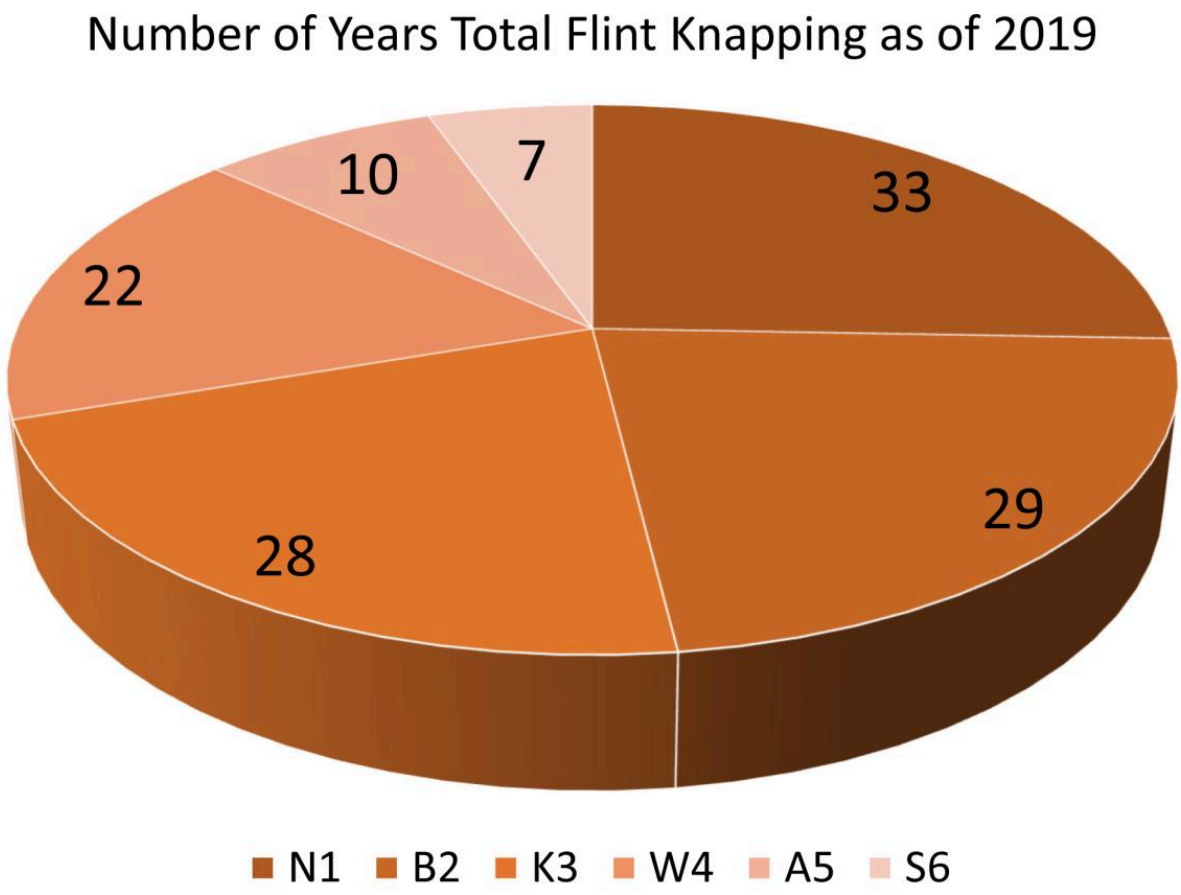
FIG 4. MASTERPIECES IN FLINT AND DIABASE. PHOTOS BY AND USED WITH PERMISSION FROM: A&C-MK'S PREHISTORIC CRAFTS/NICOLE BRODY 2019, B-PETER WIKING 2019



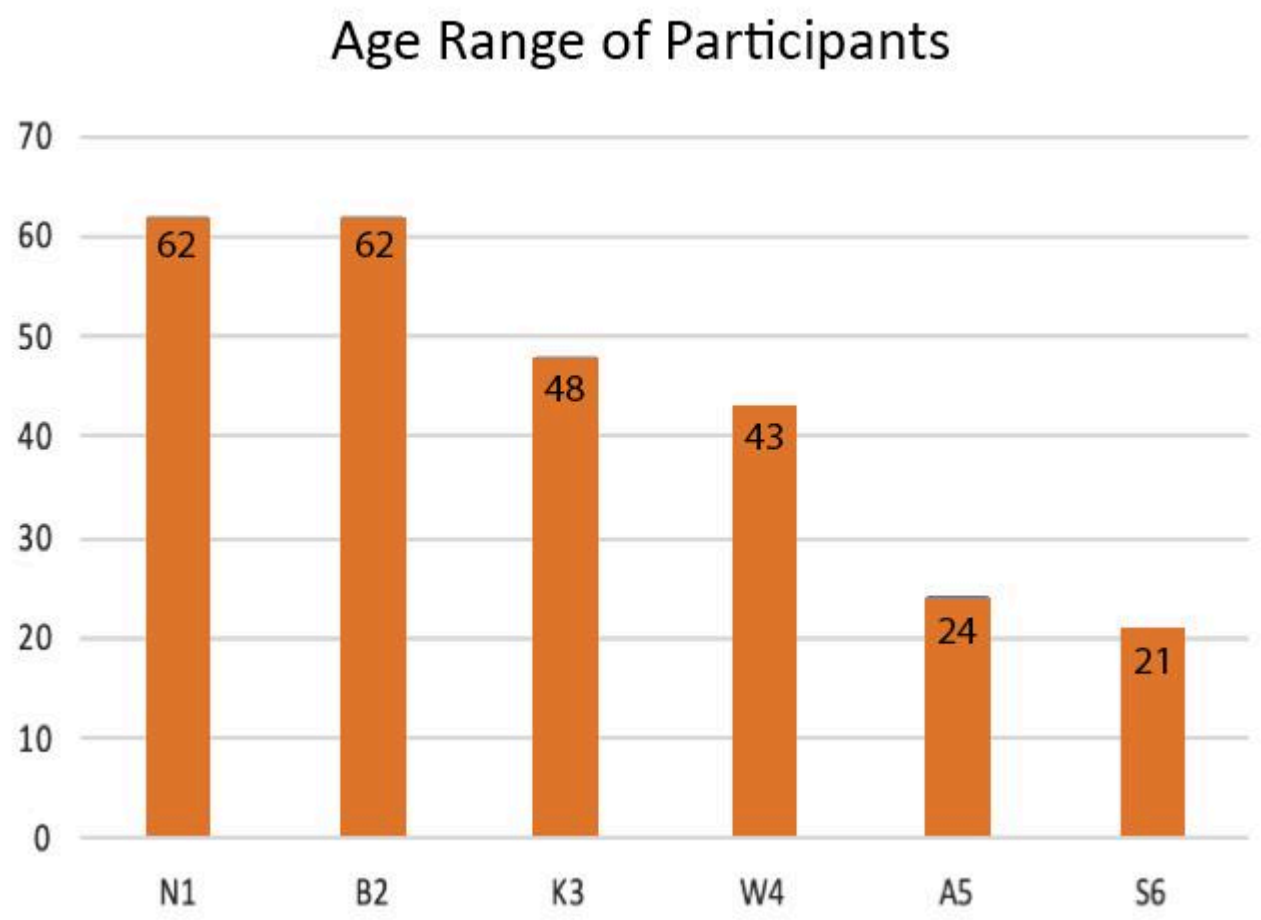
GRAPH 1. AUTHOR'S HYPOTHESIZED PRIMARY PATHWAYS OF KNOWLEDGE TRANSFER IN PREHISTORY AND TODAY.



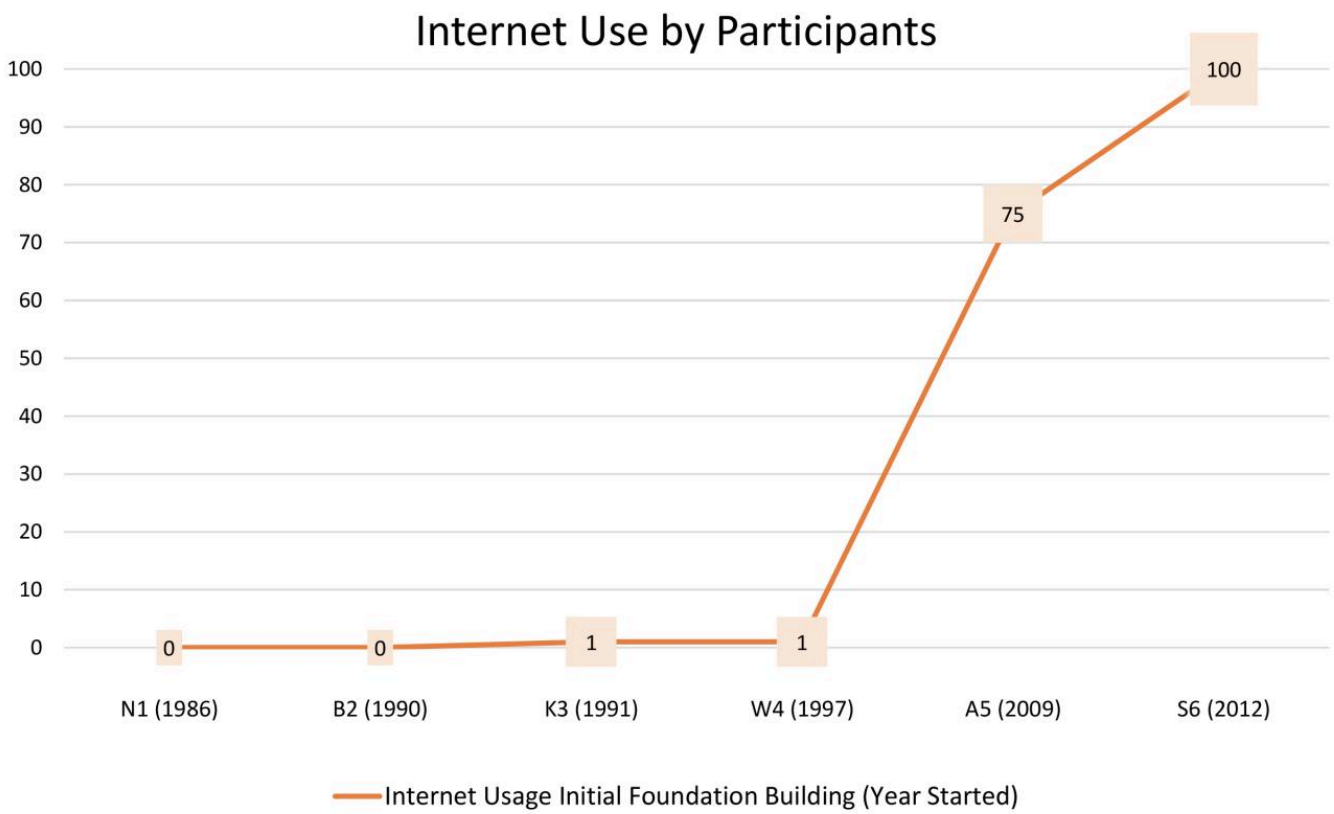
GRAPH 2. A VERSION OF DALE'S CONE OF EXPERIENCE SHOWING HOW KNOWLEDGE/EXPERIENCE IS TRANSFER AND RETAINED. BASED UPON DEEPAK, ET AL., 2014.



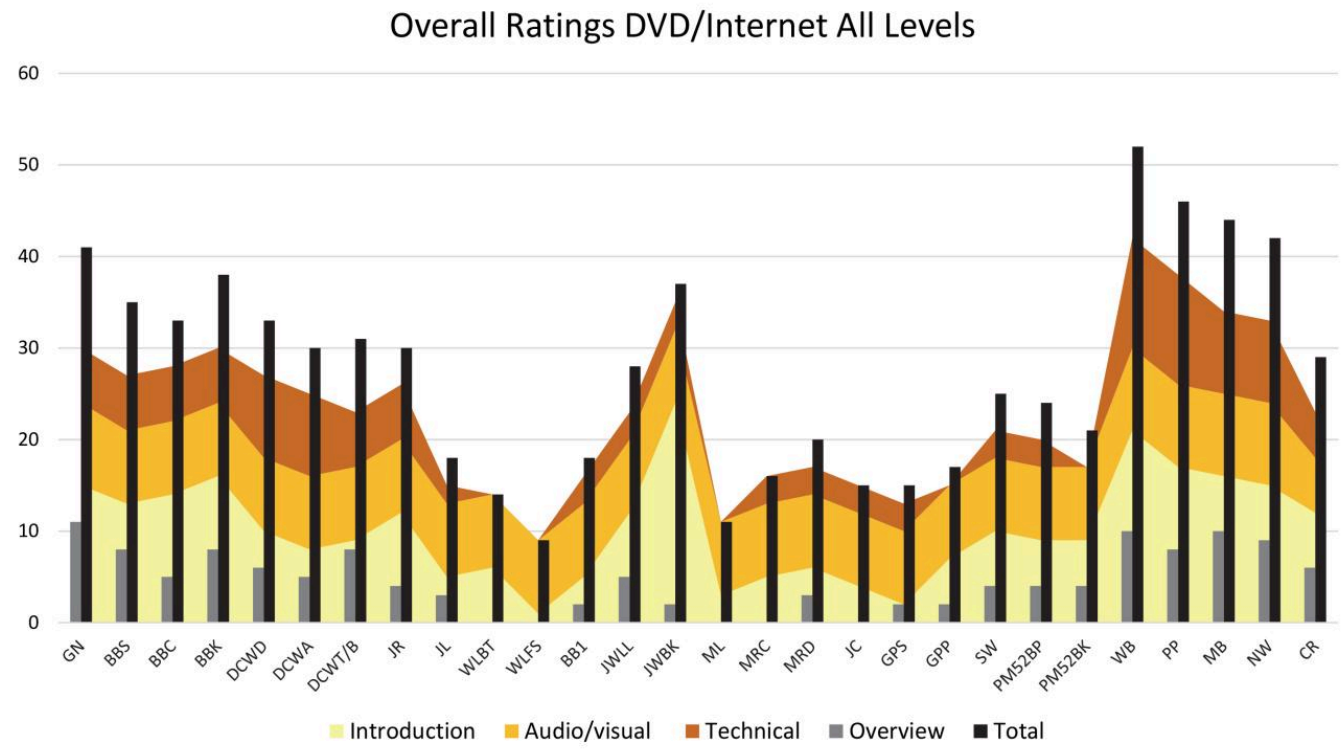
GRAPH 3. PARTICIPANTS TIME, IN YEARS, FLINT KNAPPING AS OF 2019.



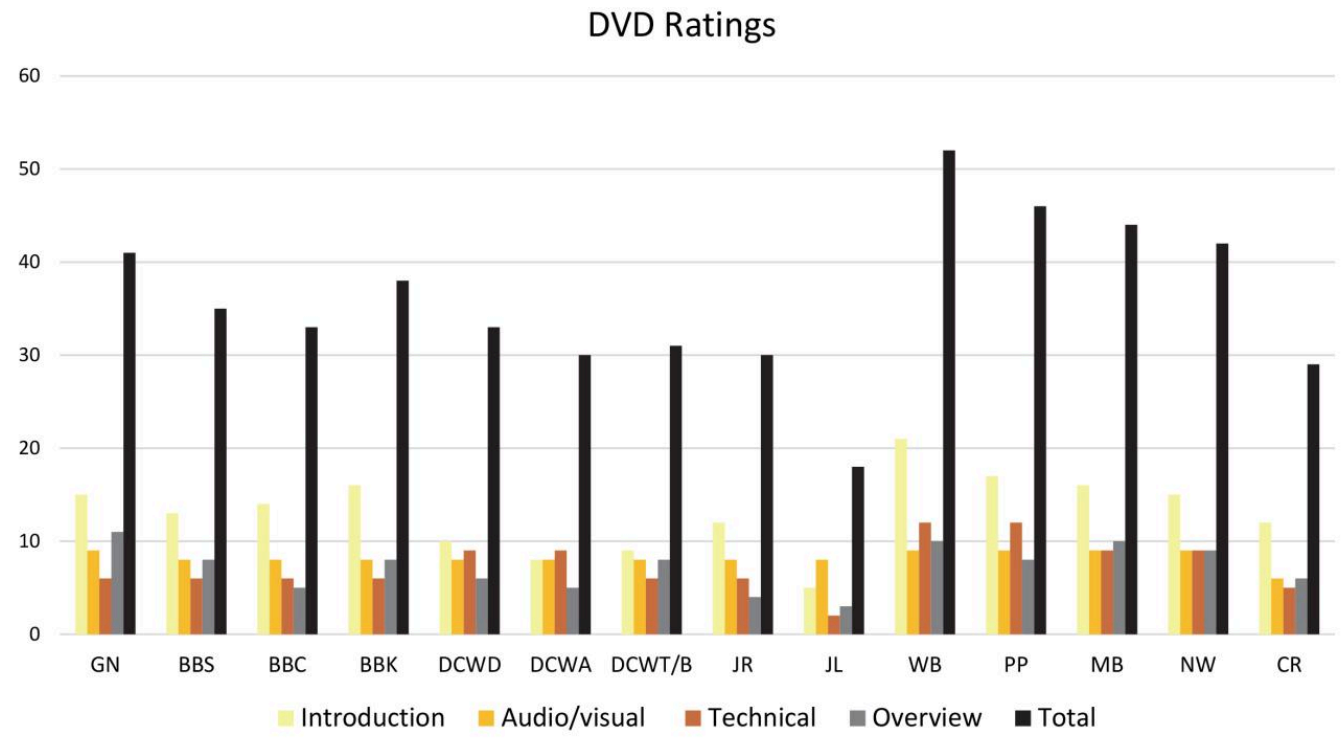
GRAPH 4. AGE RANGE CHART, IN YEARS, OF PARTICIPANTS INTERVIEWED.



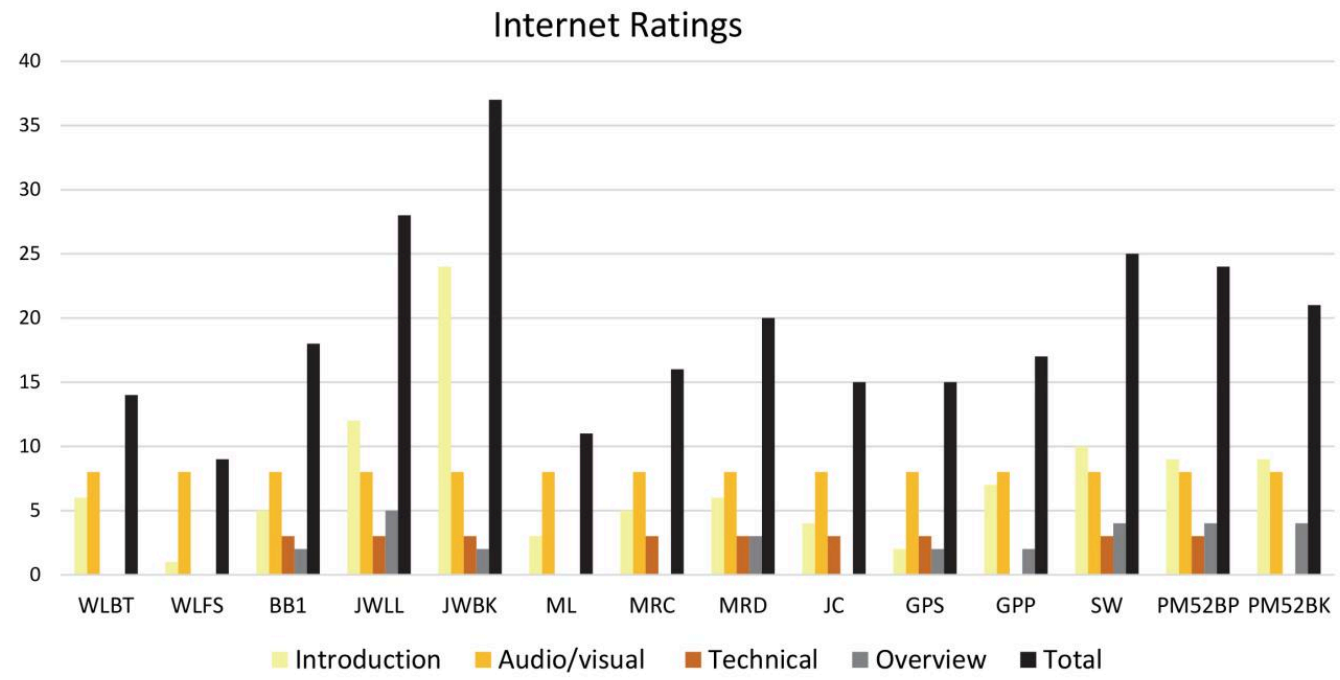
GRAPH 5. PERCENTAGE OF INTERNET USAGE BY THE PARTICIPANTS DURING FORMATIVE DEVELOPMENT. YEAR PARTICIPANT ENTERED FORMATIVE PHASE IN PARENTHESIS.



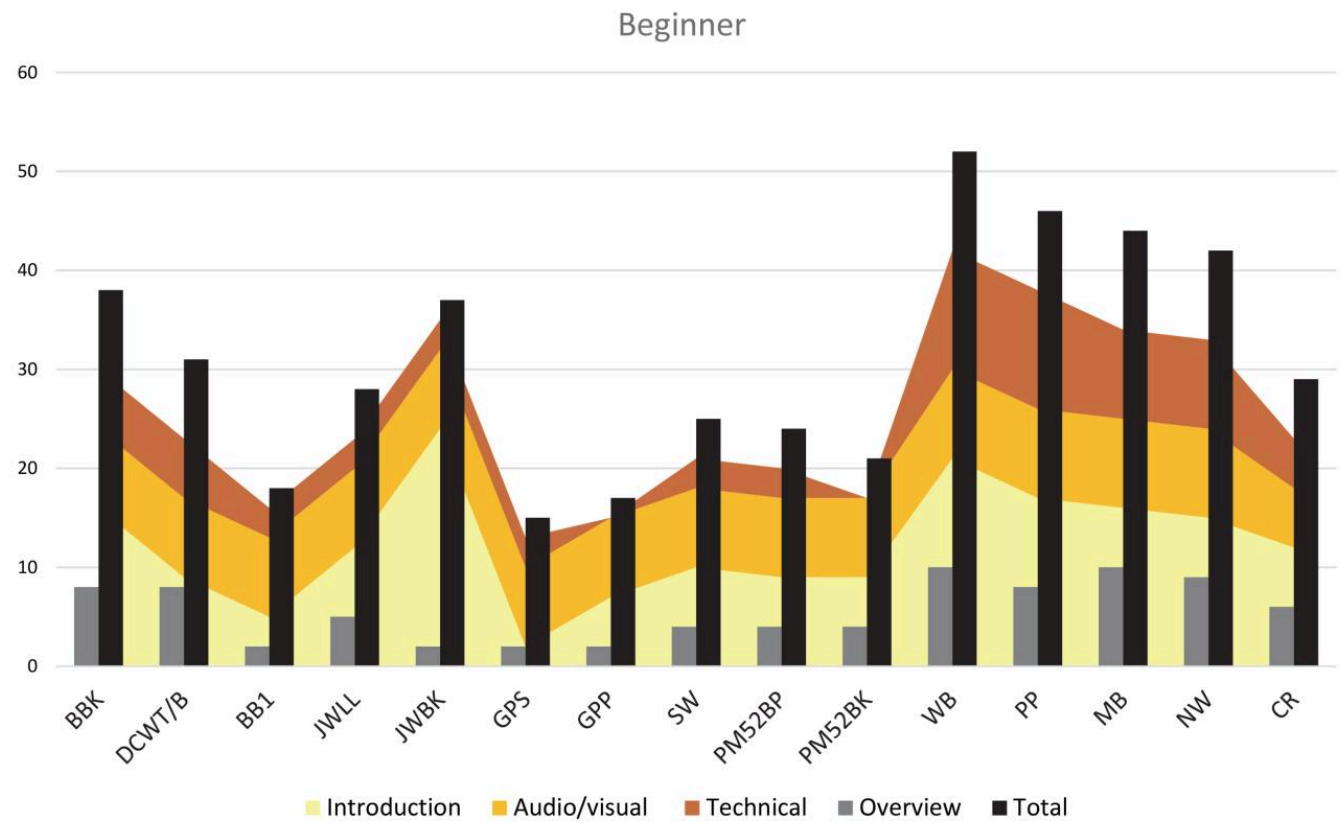
GRAPH 6. OVERALL MEDIA RATINGS



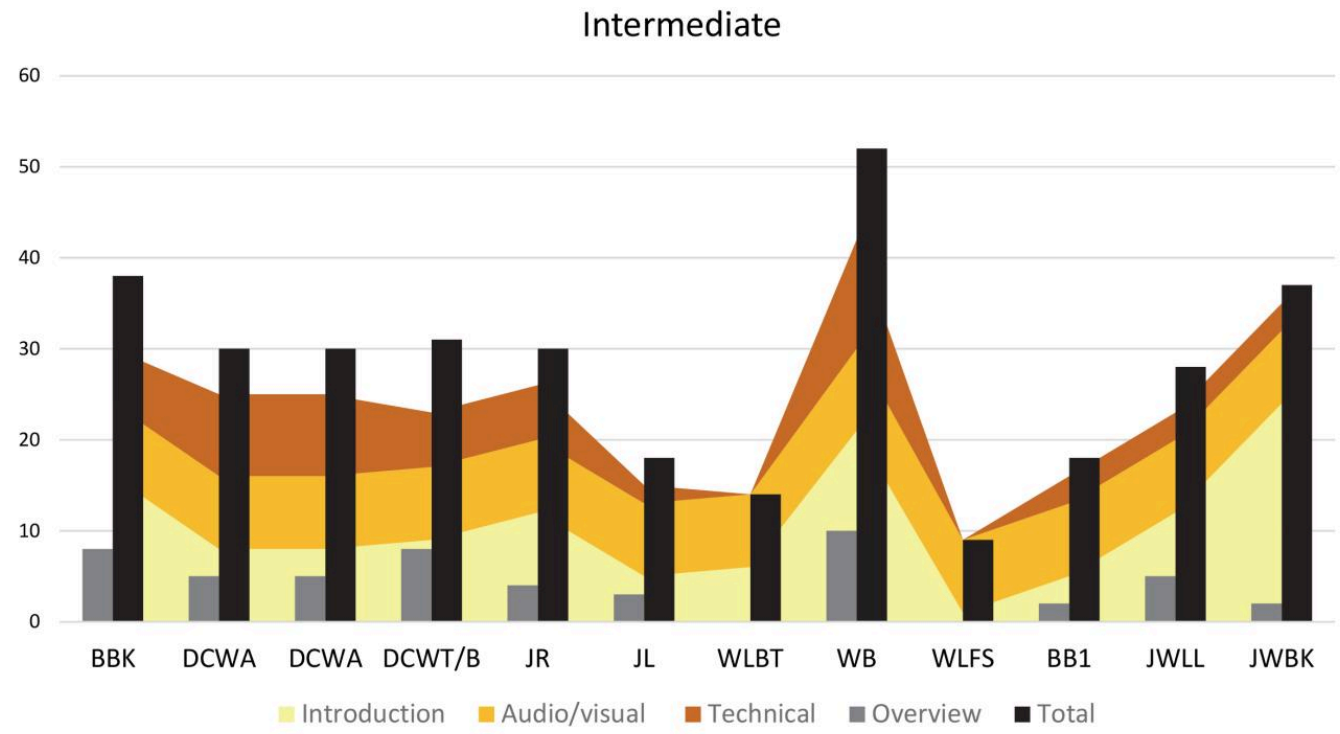
GRAPH 7. RATINGS - DVD MEDIA ONLY



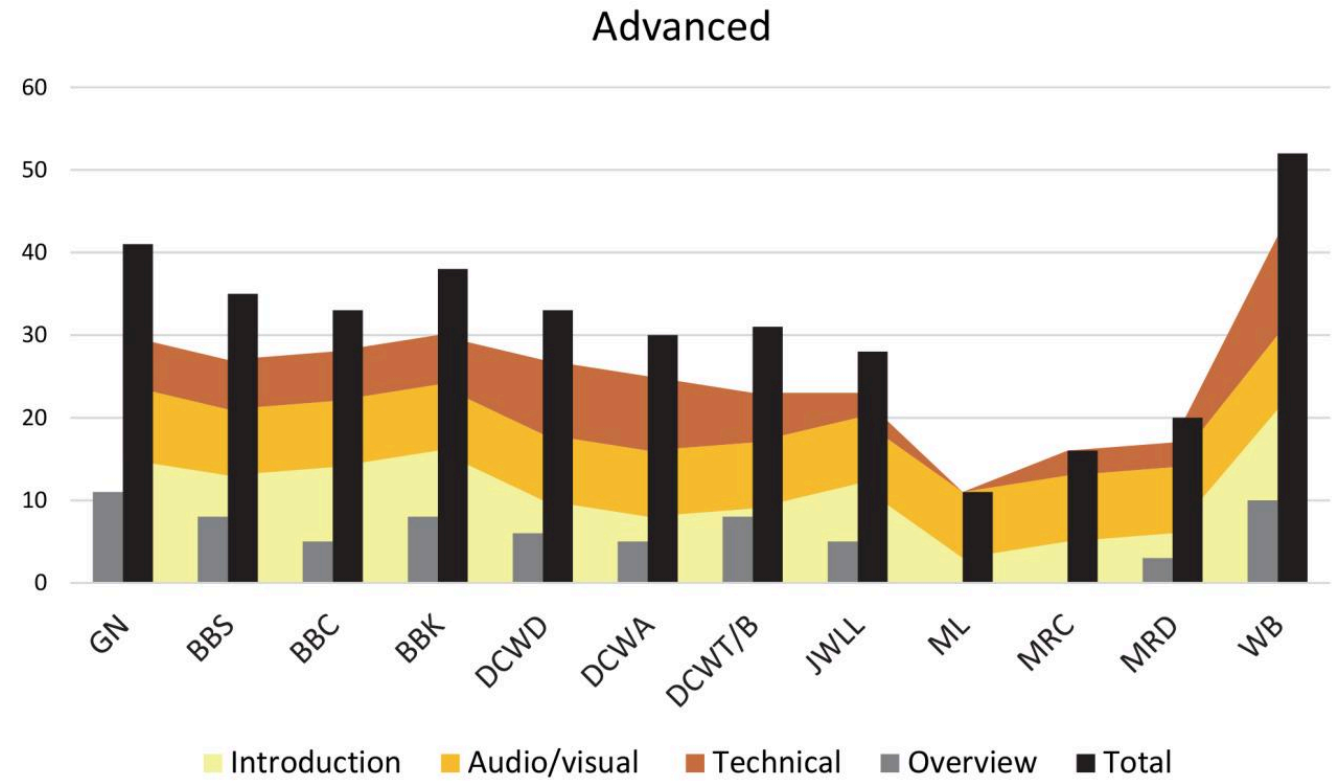
GRAPH 8. RATINGS - INTERNET MEDIA ONLY



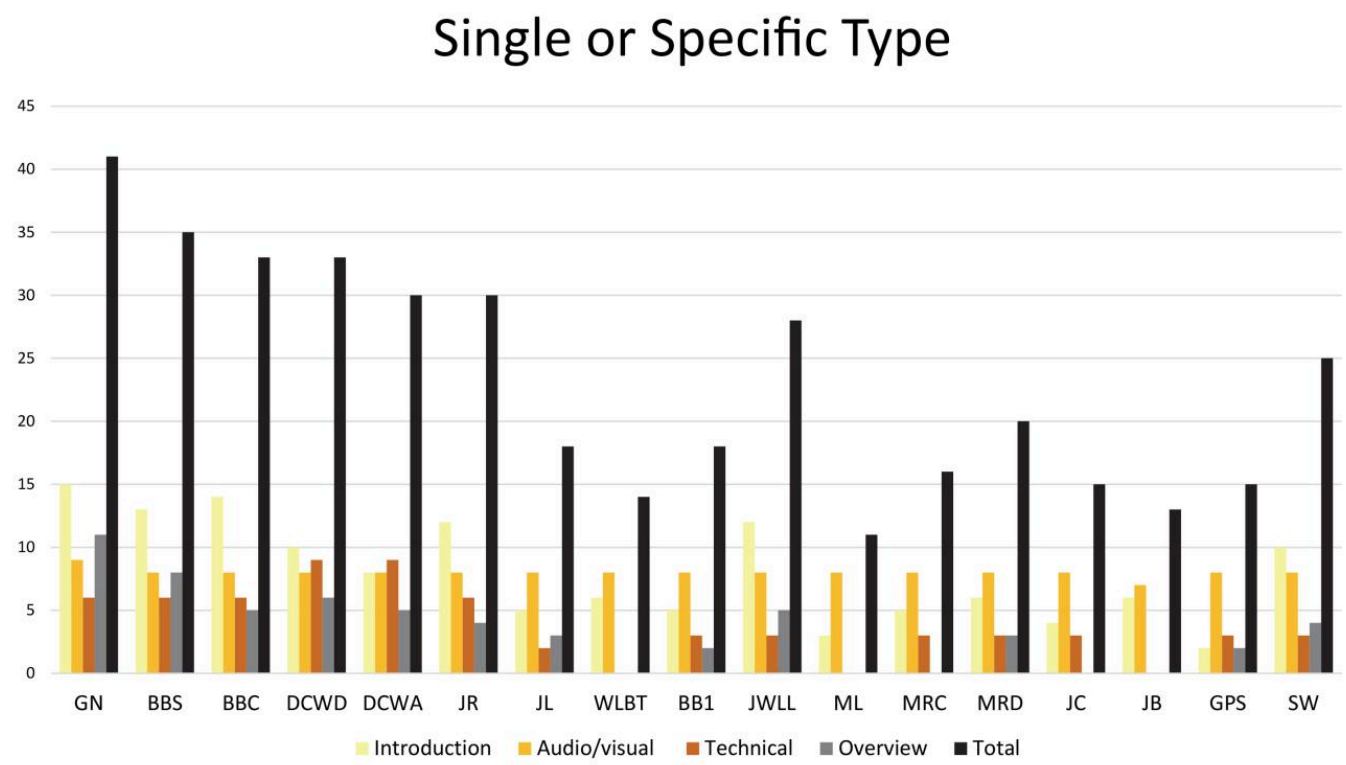
GRAPH 9. LEVEL OF INSTRUCTION – BEGINNER



GRAPH 10. LEVEL OF INSTRUCTION – INTERMEDIATE



GRAPH 11. LEVEL OF INSTRUCTION – ADVANCED



GRAPH 12. SINGLE OR SPECIFIC TYPE