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**How to teach the concept of key frames
to post-secondary students?**

By Victoria McGlynn
November 9 2015

Abstract:

This study attempts to identify how to successfully teach the concept of key frames to students in post-secondary media education. Key frames are used to help generate movement when creating visual effects inside editing software. The concept is essential for the students to learn, as it is the foundation for many more complicated visual effects required when editing. As a teacher I have noticed that students who are new to the subject of video editing often struggle with the concept of key frames when they are learning it for the first time. Using action research this study looks at investigating the best methods to effectively teach the concept of key frames by adding the component of a flipbook activity to see if it increases their success. The participants filled out several questionnaires throughout the process and completed an assignment to test their comprehension. The students indicated that the flipbook assisted in their understanding; however, it was ultimately a mix of methods that were required since each student learns in a different way.

What are Key Frames?

Key frames help generate movement to something as simple as a still image. That movement has a starting point and an ending point. To create a simple movement to a still photograph two key frames are required; one can be added to the start and another to the end of the photo clip length (see diagram 1). When the parameters of these two key frames are different from each other, it helps to define what the movement should be and when it should occur. As a result, movement is generated as it plays from one key frame, with one set of parameters, to the next key frame that holds a different set of parameters. These parameters could be as simple as altering the size, generating a change in image size. Meyer et al. further explains that:

The concept of key frames comes from traditional animation: The master animator would draw the important frames of a scene, while others filled in the frames in between. In the digital world, you determine the keyframes, and the computer calculates the frames in between by interpolating intermediate values. (2002: 9)

These in-between calculations can be thought of as the middle drawings between the key frames and are also referred to as 'tweening'.

Insert **Diagram 1**

Participants

The participants for this study were first year, second semester, undergraduates in the Broadcast Journalism program at Sheridan College. There were two groups; each with 13 students. In group A there were six female students and seven male students. Their ages ranged from 18 to 30 years, with the majority of the students being under 25 years of age; 11 out of 13. Group B also held 13 students; five females and eight males. The age range was 18-45 years, with the majority of students also being under 25 years of age; 11 out of 13.

I also surveyed 26 post-graduates who I taught the previous semester to get a preliminary sense of their understanding of key frames. For direct ethical consideration, I will protect the identity of all students and not include their names in this study. The instructor (author of article) is a part-time faculty member at Sheridan College with three years teaching experience and 10 years of practical editing knowledge.

Methodology

The study used action research in order to understand the lesson on learning key frames and the particular needs of the students. Action research is a method commonly used within education; namely for teachers aiming to improve their practice or lesson, allowing the researcher and teacher to be directly involved in both the delivering and observing of the entire process. The goal of this method is to understand and improve a particular aspect that the researcher deems important, such as how to best teach the concept of key frames? During the inquiry process, information or data using surveys will be collected, analyzed and reflected upon (see diagram 2).

Insert **Diagram 2** The cycles of the study:

Small Cycle – Post-graduates

Second Cycle – Undergraduates (Lesson 1)

Third Cycle – Undergraduate (Lesson 2 with activity)

First Cycle – Post-Graduates (Lesson 1):

Observation of the key frame lesson followed by data gathering, with the post-graduate students. The data was gathered three months after the lesson.

Reflection of the qualitative data (preliminary questionnaire).

Plan a strategy to better help the students grasp the concept of key frames. First, I plan to deliver the exact same lesson to the undergraduates to generate more data to observe and ultimately improve the lesson.

Second Cycle – Under-graduates (Lesson 1)

Action by applying the planned strategies to the undergraduate students. Repeat the same lesson that the post-graduates received last semester.

Observation of the key frame lesson followed by data gathering (questionnaire #1). Are the results similar to the post-graduate students?

Reflection on the qualitative and quantitative data allowing better insight in the understanding of key frames.

Plan a strategy to better help the students grasp the concept of key frames.
(update lesson, examples, terms, include an activity)

Third Cycle – Undergraduates (Lesson 2 with activity)

Action by applying the planned strategy of second lesson and flipbook activity.

Observation of the 2nd lesson on key frames and planned activity with the undergraduate students. Did their understanding of the concept improve?

Reflection on the qualitative and quantitative data gathered during and after the lesson (Questionnaire # 2).

Procedure / Measurement

Observation (of lesson)

When I taught key frames to the post-graduate Journalism New Media students the previous semester, I noticed that they struggled with the concept. I was curious to know if the issue resided with the concept itself, or how I was conveying the information in the lesson.

Reflect on data (Preliminary Questionnaire)

Martha Wiske defines a key feature of reflection as, the ‘process of standing back from [the] experience and examining it in ways that generate meaningful knowledge’ (2005: 105). Three months after the initial key frame lesson, the post-graduate Journalism New Media students were asked through an emailed questionnaire if they struggled (or still do) with the concept of key frames. Only six out of the 26 students replied to the questionnaire; four females and two males. The small number of replies could have been due to the fact that it was sent through email and not delivered in person. However, this was the only option since there was no other form of contact with these particular students. In addition, the low response could have been a result of it being too long a period for them to recall the key frame lesson in order to answer the questions appropriately.

Three out of the six students who replied to the questionnaire came into the program with moderate experience with technology and exposure to basic editing software, such as iMovie. The remaining three students had very minimal experience with technology and no editing exposure. This split was a fair representation of the 26 students in the course. Four out of the six students found that the concept of key frames was difficult to grasp when first introduced and still found the concept confusing. When asked if the instructed steps were too complicated, three out of six did not think that was the case. All the students who replied to the questionnaire seemed to indicate that they perceive to learn best by practicing or ‘doing’ an exercise inside the software. This reinforced the importance of allowing time to not only show how, but then letting the students immediately practice during class.

Plan (for change)

This preliminary questionnaire indicated that the initial lesson on key frames could be improved. Half of the students who replied to the questionnaire mentioned that they found it difficult to visualize the desired movement before using the key frames to implement the effect. There needed to be a better way to help students envision the effect before applying it and therefore understand the concept of key frames.

Lesson # 1 (ACTION)

The three-hour lesson was split into two halves. The first part of the lesson was delivered in the same manner as the previous semester to the post-graduate Journalism New Media students. I not only wanted to see if the new results would be similar to the post-graduate feedback; but in addition, more data was required to analyze and develop a strong solution to the problem; how to best teach key frame.

The lecture included a step-by-step demonstration that the students followed along inside the software. The participants were shown how to add key frames to a still photograph in order to generate a subtle movement to the image. The students were given 25 minutes to try this animation technique on their own. The instructor walked around the class and helped students individually, guiding those who needed assistance. The students completed a quick one-page anonymous questionnaire about their current level of understanding on key frames.

Lesson # 1 OBSERVATION

Two students in the group A needed clarification on how to apply the key frames on their still photograph. This could have been for a number of reasons; they could have been looking away from the projection screen or were still importing their photo into the application and missed this step. The majority of students followed along with the steps without any issues. However, group B was much slower to grasp the concept. Instructions needed to be repeated many times throughout the lesson; and constant encouragement for the classroom noise level to reduce when the students were given time to apply the effect.

Questionnaire # 1 (Raw Data)

When technology is used in the classroom it is important to bear in mind what the students past experience may be with that technology; the access they have; experience with it; and the different learning styles (McKeachie et al.: 2006). The students were asked about their past experiences on the questionnaire and six of the participants in group A indicated that they have had a lot of exposure to computers, whilst five revealed they only had some exposure. All thirteen participants owned their own computer prior to entering this program and ten of them stated that they were very comfortable with computers and software. When asked if any of the participants had used any editing software prior to entering the program, only two individuals admitted to having none.

Eight of the participants in group A had never heard of the term key frame prior to the lesson and only two admitted to having trouble understanding the lesson. One of the participants was confused at the beginning, but caught up with some one-on-one help from the teacher. The other struggling participant felt the pace of the lesson was too fast for them. This student also expressed having only basic computer knowledge so that may have been part of the struggle. Meanwhile numerous participants expressed that the pace was ideal and or easy to follow. When asked if the participants were able to visualize an effect prior to implementing it, eight students claimed yes, while five admitted that it was harder for them.

In the B group, seven participants expressed having lots of exposure to computers, whilst six only had some exposure. One participant confessed to this being the first time they owned their own computer. Nine participants stated being very comfortable with computers and software, although one of them indicated struggling to learn any new software. Ten participants had never heard of key frames, whilst three had. When asked if the participants found any part of the lesson confusing, ten of them replied no and three replied yes. One participant expressed, 'it's sometimes difficult to keep up.' When asked if the steps were too complicated the same participant replied, 'not exactly, but it would definitely be easier with isolated instruction.' This student did however indicate wanting more time to practice, so perhaps as part of their learning curve they need more time inside the software.

All thirteen participants indicated that the key frame steps were not too complicated. When asked if the participants were able to visualize the movement before implementing the effect, six said no, whilst five said yes. Two students felt that they were able to visualize only after being taught. These results were similar to the post-graduate preliminary outcome, so it is safe to say that approximately half of the students struggle with being able to visualize an effect before implementing it.

Findings (REFLECT on data)

The teacher began working with these two groups of undergraduate Journalism students in the previous semester, upon them entering the program. At that time, she found that the majority of them struggled with learning the editing software for the entire first month of its use. The few students that had pre-exposure to editing seemed to grasp the learning slightly faster than those who did not have the exposure. Barkley states, 'an engaged student actively examines, questions, and relates new ideas to old, thereby achieving the kind of deep learning that lasts' (2010: 17). Those students, who had a previous experience with editing, were able to transfer their previous knowledge and bring it into the new software. It became obvious that having pre-exposure to other software had been a large asset to those students when learning about key frames. This is one of the largest challenges as a teacher; bringing all the students skills to the same level, whilst keeping the interest of the more advanced students who already have some of the knowledge and experience.

In keeping with prior knowledge and understanding, I decided to enquire as to how many students had previously attended an education establishment. Ten out of the thirteen in group A admitted to attending post-secondary schools prior to attending this program; however, the B group had only four out of thirteen students with prior post-secondary education. When comparing the difference between the groups, there was more pre-exposure to education, technology and a variety of other editing software with group A. David Buckingham (2007) introduced the term 'new digital divide', which is described as the gap between students who have exposure to technology outside of the classroom with those only having exposure in the classroom. The important factor is the access to the technology and not all students

have equal opportunity outside of school. I knew that I needed to find a solution or activity that was non-computer based to help remove this gap so the students could equally learn the concept of key frames.

Solution: A Flip Book Activity (PLAN)

Since technology and software was a challenge for some students, by implementing a non-technology based activity it could help the students understand and focus on the concept on a more basic level before having to tackle the challenge of implementing the effect inside the software. McKeachie et al. (2006) discusses how an in-class activity helps to split-up the passive learning process that students often get into with a lecture style delivery. In-class activities engage the students to think while implementing a specific task with the hope that they reflect up on it afterwards. Many of the students mentioned that they had a hard time visualizing the concept of key frames. In response to this, a flipbook might help the students to visualise the placement of key frames and the generated frames between them that are represented on all the in-between pages. A flipbook would physically show the students where the key frames go when generating movement. Barkley supports:

Since everything we know and understand is preserved as a network of associations, the more associations we make, the greater the number of potential places we have to attach new information and the easier it is for us to learn and retain that information. (2010: 21)

In addition, the Media Teacher's Book (2006) has a number of useful activities that can be used in a variety of media production courses. In particular, the 'reverse storyboarding' activity expresses how important it is to have students "thinking with their hands" in order to aid in the development of "their textual analysis skills and their eye for moving image composition" (Learning Plan 2.5: Storyboard in Reverse). By starting with the simple concept of a flipbook, the more complex aspects of key frames can then be introduced inside the software.

Lesson # 2 with activity (ACTION)

The second part of the key frame lesson introduced the concept of *tweening*, which are the generated frames (or movement) in between the two main key frames. The students were shown more complex moves within the editing software; pans and tilts on a still photograph. They were given 20-minutes to practice this. Lastly, the in-class flipbook activity was assigned. The students were shown some examples of basic flipbooks. A flipbook artifact was also passed around the class so they could see how the progression was drawn on each page to generate the effect. Blank flipbooks made of white card stock and a metal-clip were handed out to each student. Pencils, erasers, and coloured markers were provided. The students were given 40-minutes to complete the in-class activity.

All 20 pages of the flipbook needed to be used, including the cover page. The movement needed to be continuous and the drawing comprehensive, encouraging the students to keep it simple. They were to pick a shape or basic object and make it move either across the pages or change in size to mimic the animated movements we were generating inside the editing software using key frames. An emphasis was made that the first page of the flipbooks represented the starting position, or first key frame, and the final page was the end position of the movement where they would place their second key frame. The flipbook animated the image from page to page. Upon completion of the activity, the students filled out the second side of the questionnaire to see if the students' understanding had improved, stayed the same or became worse between the two ways of delivering the concept of key frames; lesson one and lesson two.

OBSERVATION of Lesson # 2

When the activity was announced the students became rather excited to work on it since the class is mostly technology based. The mood in the classroom was very positive and the students got involved by showing each other their flipbooks giving each other feedback. The two groups equally seemed to understand why we were doing the activity in relation to key frame lesson. When the students were asked why they enjoyed the flipbook activity, they responded with, 'it was fun,' 'it was different,' 'it was hands on / craft-like.' Once the students had finished filling out the questionnaire,

they were asked which lesson was clearest, lesson one or two. A couple of students voiced that the first lesson was very clear and gave a solid foundation of the concept, then the second lesson drove it home.

Questionnaire #2 (Raw Data)

Eleven out of the thirteen participants in the A group felt that their understanding of key frames had improved after the second lesson (see diagram 3). None of the students indicated that their understanding had become worse, but two expressed that their understanding stayed the same. One of them felt that they already had a history with key frames and a strong background with other editing software. The other student felt that the first lesson was enough and did not expand very much on many of the other answers on the questionnaire. When asked which methods helped the participants to better understand key frames it was a high score tie between the flipbook activity and the visual examples shown in the second lesson. This was followed closely by the 'doing or playing inside the software.' The participants' perception of what they think was the best way for them to learn technical components like key frames were by demonstration. A close second was by 'doing or practicing' in the software. All thirteen participants expressed that the steps in the second lesson were not too complicated. One student wrote, 'no, it made it easier because we got to do it on paper.' Another student stated, 'my understanding improved greatly.' A couple of the participants did not answer the final question about possible suggestions, while the most popular comment was how well the flipbook worked for them.

Insert Diagram 3

In group B twelve of the thirteen students indicated that their understanding of key frames improved by the end of the second lesson (see diagram 4). Only one student circled that their understanding had remained the same. This participant also indicated that the steps were too complicated in the second lesson, so perhaps the student may have gotten lost in the demonstration and as a result felt their understanding stayed the same. They also indicated needing more time to practice and suggested a video tutorial might help them.

Insert **Diagram 4**

In contrast group B felt that the best method for understanding key frames was by 'doing or playing' in the application. Followed by both the flipbook and visual examples as other useful methods of teaching key frames. This group perceived that the best way to learn key frames was firstly by demonstration and secondly with practice. Ten of the thirteen participants indicated that the key frame steps in the second lesson were not too complicated to understand. The remaining three students struggled at first, but with more demonstration and practice started to feel more comfortable with the concept. Six of the participants expressed wanting more practice as a suggestion to make the learning of key frames easier. Five wanted more demonstration.

Findings (REFLECT on data)

The flipbooks not only represented an alternative method for understanding what a key frame does inside the editing software, but it also generated a form of media on paper that was unique to each student. The activity also aimed to give the students the confidence to try something new and play when learning a new concept. Buckingham (2003) encourages play and curiosity when it comes to media learning, utilizing a blend of 'hands-on' creative production and critical thinking. This further supports Martha Wiske (2005) and her beliefs that in-class activities reinforce student understanding more than practicing routine skills or memorization. Additionally, S.K. Saha discusses how old-fashioned methodologies, such as one-way communication in technology and media education are predominately still used in the present day classroom. Saha's study indicated that the introduction of fun and games in media education did help with the learning of a technical subject.

Of the five participants in group A who initially struggled to visualize their effects before implementing them, all revealed that their understanding of key frames improved after the second lesson. Four out of the five participants indicated that the flipbook helped to improve their understanding (see diagram 5). Though the second lesson introduced more complex moves requiring extra steps, the majority of the students did not think the steps were more complicated. In the B group, six students

struggled to visualize the effect prior to implementation. All, but one student improved their understanding; two by doing or practicing and three of them with the flipbook. As a result, the flipbook activity did help the majority of the students understand the concept of key frames, while requiring the student to critically think about a traditionally technical component.

Insert **Diagram 5** Questionnaire Question (for both groups):
What of the following methods helped to understand key frames?

One of the questions asked the participants to circle any of the listed options on what they thought might be the best way they learn technical components in the classroom. This is purely the students' perception of the best way they learn. It may not be the most accurate claim, as many students may not actually know their true learning styles. Their answer may be based on what they enjoy the most, which could be linked to being their best style, but not necessarily concrete. The outcome of both groups on the second questionnaire proved to be very similar. The majority of the students improved their understanding of the concept of key frames. They both seemed to think that demonstration and practice was the best method to learning. Both groups chose the flipbook activity and visual examples as effective methods for understanding key frames; however, the afternoon group felt even stronger that the practice was also essential to the learning process (see Diagram 5). The data reflects that not just one method and teaching style will work for a class of varying students, but instead the mix was what helped to deliver to a diverse group of learners.

Further Data

Photo Assignment (Raw Data)

The students submitted a stills assignment one week after the key frame lessons. The assignment required their knowledge and execution of key frames to generate movement on each of their 12 still photographs in the assignment. The students submitted both a QuickTime movie file and their editing project file, so the teacher could step inside the software and see exactly where and what the parameters were on each of the key frames. This gave the teacher a clear indication of the students understanding of the concept.

Group A resulted in seven out of the thirteen students showing exceptional knowledge and application of key frames (see diagram 6). This was based on five components; placement of key frames, if they included any extra or unnecessary key frames, the fluid movement between key frames, and if there was a mix of zooms, pans and tilts for the 'type' of movement. The minimum requirement was to do a simple zoom-in or pullout movement. Of the thirteen students, two did not provide their editing project file, so some of the five components could not be checked; but, based on watching the QuickTime, it had fluid movement and conducted both a zoom in and pull out. All remaining students had perfect placement of key frames with no stray additions or confusions. Nine out of eleven had fluid movement between the key frames and all students' performed both a zoom-in or pullout movement. Seven out of the eleven students included a mix of in/out zoom and left/right pan and up/down tilt.

Insert **Diagram 6**

Group B had similar results with seven out of thirteen students showing exceptional understanding of key frames. One student did not provide the editing project file and two students inserted an extra key frame in a few of their stills; so overall, nine out of twelve students understood the placement of key frames on each clip. One out of thirteen had movement that was not fluid. Seven out of thirteen included a mix of in/out zooms, pans and tilts. These results indicated that the students were demonstrating a strong understanding on how to use key frames.

Reflect on Data

Every single student demonstrated that they understood key frames and more than half were able to take it a step further, indicating they were able to perform the more difficult moves; pans and tilts. The reason that performing pans and tilts were exceptional was because there was only one demonstration during class and it was not broken down into steps on the handout. This means that when the students completed their stills assignment on their own time, they were able to implement the more difficult moves, simply because they understood the concept of key frames, and were able to apply a more complex move than what the handout provided.

Conclusion

Ivers et al. (2010) talk about establishing the student as an active participant in the process of learning. Whether the students were aware of it or not, by getting them involved with the flipbook activity they were taking an active role in their learning process. Additionally, the introduction of fun or play, as suggested by Light et al. (2009), Saha (2006) and Buckingham (2003), the flipbook did help reinforce learning for these journalism students.

A study by Berger & McDougall (*L.A. Noire* 2013) included research on media literacy using video gaming in an English classroom, which utilized media education as a tool to teach English literature. Whereas this *key frame* study does the opposite by using the flipbook activity to step away from technology in order to teach a media technique inside a media editing course. Though the *L.A. Noire* investigation was a much larger project, both studies aimed to teach students in a reflexive manner that was outside of the traditional realm of the given subject.

As a media educator one constantly tries to think of multiple yet innovative ways to teach a concept within the media field. Though this study specialized in solving a particular problem, the solution and results can hopefully inspire other media educators to try something new in their classroom to encourage critical thinking in a different way. Buckingham supports this notion with:

New digital media require[s] a rethinking of existing conceptual frameworks and pedagogic practices, in ways that take many of us [educators] beyond our 'comfort zones'. (2007:117)

This study revealed that not just one method was effective in the students understand of *key frames*. A mixture of visual examples, demonstration, the flipbook activity, and most importantly, time to practice, were all ideal for the students to better grasp the newly learned concept. An original enquiry to see if one lesson or method was better than the other, resulted in a realization that both are necessary as building blocks. Each lesson increased their exposure, knowledge and further developed the understanding of the *key frame* concept. Each student has a different method and pace in which they learn best, so therefore it should be explained and delivered using diverse methods. Flipbooks can be used in media education as a teaching tool. It can

be used to learn about key frames, as per this study, but it can also facilitate a number of other lessons, such as learning about the breakdown of static frames that make up the moving imagery of film.

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