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USING DIGITAL TECHNOLOGIES TO ACTIVATE AND EVALUATE EMOTIONS TO CREATIVELY COMMUNICATE IDEAS

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Abstract

Given the Digital Technologies rationale of the Australian Curriculum, it is critical that both teachers and students use design thinking to be creative and innovative producers of digital solutions and knowledge. Teachers and students are increasingly being required to self-produce films and digital content across subject areas. Their productions are often used as a catalyst for discussion in the classroom or to illustrate mastery of curriculum content. Producing films and digital content that are engaging and also successfully conveying educational messages is challenging. Filmmakers engage audiences by using film techniques to activate different emotions. Producing learning content that is engaging and activates those emotions that support learning requires an understanding of the craft of the filmmaker and those academic emotions that learners experience when learning. We present an evaluation tool based on those emotions that learners experience when learning (Pekrun, Goetz, Titz, & Perry, 2002) or those emotions different film techniques can provoke in viewers. The tool or Wheel of Academic Emotions (WAE) is useful for design thinking and for evaluating whether films and other digital productions activate the emotions known to support learning. We argue the WAE is timely because it provides teachers and students a useful tool to be creative and discerning decision-makers and to evaluate their digital content critically to ensure it communicates their ideas.

Keywords: Digital technologies, digital solutions, academic emotions, activity emotions, design thinking, multimodal literacy practices

Introduction

Across subject areas, students draw on their out-of-school digital literacy practices to engage in design thinking to produce creative and innovative digital solutions. These innovative solutions are increasingly films, animations or other digital content that creatively communicates their ideas across a range of settings. The Digital Technologies rationale of the Australian Curriculum highlights the 'processes and production skills' students need to engage in to create digital solutions. These include *defining*, *designing*, *implementing*, *evaluating and collaborating* and *managing* from foundation to year 10.

Subject area teachers, drawing on the Digital Technologies Rationale, encourage their students to define and unpack real-world problems that emerge from their lifeworlds and use design thinking to create provocative interactive solutions. To do so, children and young people are creatively sharing their ideas and representing curriculum knowledge through multimodal design (Walsh, 2007; 2009) drawing on their out-of-school digital literacy practices (Beavis, Bradford, O'Mara & Walsh, 2009; Burnett, 2014; Hague & Payton, 2010; Jacobs, G, 2012; Nixon & Comber, 2005; Walsh, 2009; Williams, 2005), systems-based literacy practices (Walsh, 2010), gaming literacy and game design practices (Apperley & Walsh, 2012; Cira et al., 2015; Owston, Wideman, Sinitskaya & Brown, 2009) computational thinking (Anton & Barany, 2013; Bers, Flannery, Kazakoff, & Sullivan, 2014; Harlow and Leak, 2014) and design thinking skills (Carroll et al., 2010; Kangas, Seitamaa-Hakkarainen, &

Hakkarainen, 2013). These are all necessary, to some degree or another, when designing information systems and diverse multimedia to make sense of complex ideas and relationships across all areas of learning.

With the ubiquity of mobile technologies, children and young people are being encouraged to produce films and animations in their classrooms (Hepple, Sockhill, Tan, Ashley, & Alford, 2014; Dunkerly-Bean, Bean & Alnajjar, 2014; Emert, 2014; Levido, 2014; Marsh, 2006 Valkanova, & Watts, 2007; Wohlend, 2013). Many students come to school with mobile phones and tablets that provide unprecedented opportunities for them to use powerful and easily accessible cameras and editing software. To use these successfully, to create diverse media, requires students to acquire a new set film techniques. These are often referred to as the five elements of film. Knowledge of these techniques can assist children and young people produce films that take viewers on an emotional journey. These five elements of film include:

- misé-en-scene or what is in front of the camera (Redmond, 2015);
- cinematography (Plantinga & Smith, 1999);
- music (Cohen, 2001; Douek, 2013);
- narration or the use of stories (Dates, Mountain, & Movies, 2010); and
- editing (Smith, 2005).

Understanding how to leverage these film techniques is crucial to produce digital media that provokes, inspires and challenges. We argue proficiency in these five film techniques is equally needed alongside the digital technologies processes and production skills required to successfully design digital solutions. Proficiency in these film techniques is critical because when skilfully coupled with the content of the film, they assist the filmmaker in activating emotions in viewers. Learning how to activate emotions through multimodal design is far more complex than learning the Australian Curriculum's Digital Technologies' processes and production skills. The film techniques are more closely related to the multimodal literacy practices or the meaning-making skills need to produce multimedia that require students to reconfigure "the representational and communicational resources of image, action, sound, and so on in new multimodal ensembles" (Jewitt, 2008, p. 241). More critically if we view these film techniques as multimodal literacy practices, we can argue children and youth need to explicitly be taught these techniques so they can successfully produce films as digital solutions.

Using film techniques to activate emotions in viewers may appear easy at first, particularly when most genres of films are produced for entertainment purposes. Consider the iconinc and popular movie *Jaws*, (Speilberg & Zanuk, Brown, 1975) directed by Steven Spielberg 40 years ago. The film commences with emotional cues inviting the audience to feel disturbed and fearful. This is achieved by setting the opening scene in near darkness, a known emotional cue for fear (Haselton & Ketelaar, 2006). The disturbing and haunting scene is a moonlight beach with a silhouette of a person entering the sea, small waves are heard breaking on a beach with an occasional bell from a navigation buoy. The swimmer sinks into the sea disappearing, the only sound to be heard is that of the bell. The audience is startled by a close up of the swimmer's face as she emerges, with a satisfied sigh. The swimmer is then viewed from underneath the surface and two musical notes in succession, a steady F, then F# played on a cello in a low octave announce the arrival of the *beast* or great white shark (Tylski, 2015). The music powerfully activates the emotion of fear because it is heard in-side and outside of an audience's heads, through hearing and vibrations (Thompson, 2002). In this sense there is no escape from sound as the audience cannot close their ears in the same way they close their eyes. Use of film techniques like music, described above, becomes more difficult when the film or digital solution must convey an educational message.

Producing films and digital content that are engaging and also successfully conveying educational messages is even more challenging. Filmmakers engage audiences by using film techniques to activate different emotions. Producing learning content that is engaging and activates those emotions that support learning requires an understanding of the craft of the filmmaker and an understanding of

emotions that learners experience when learning. These emotions are known as academic emotions (Pekrun, Goetz, Titz, & Perry, 2002).

In what follows, we present the five film techniques and provide a brief introduction to the field of academic emotions. We illustrate the valence of academic emotions and argue it is important for children and young people to understand how activating certain emotions either support or do not support learning. Then we introduce the Wheel of Academic Emotions (WAE) that Stephen (author 1) designed for his MPhil study. We illustrate how the WAE is useful for design thinking and when coupled with an understanding of film techniques, strengthens students' multimodal literacy practices. This is because students will possess a more nuanced understanding or how their skills of multimodal design, when producing a film or other digital media, can employ film techniques to activate emotions that support learning. In conclusion, we argue the WAE is timely because it provides teachers and students a useful tool to guide the design of digital content to also critically evaluate their designs to ensure they communicate their ideas creatively.

Film techniques and how they activate viewers' emotions

The Digital Technologies Rationale of the Australian Curriculum states:

> All young Australians should develop capacity for action and a critical appreciation of the processes through which technologies are developed and how technologies can contribute to societies. Students need opportunities to consider the use and impact of technological solutions on equity, ethics, and personal and social values. In creating solutions, as well as responding to the designed world, students consider desirable sustainable patterns of living, and contribute to preferred futures for themselves and others. (¶ 5)

Children and young people's knowledge of film techniques is becoming increasingly important because these techniques represent their capacity to use design thinking, multimodal literacy practices and new technologies to produce media that evaluate and report on a contemporary social, ethical or environmental sustainability issues. More importantly, these skills are transdisciplinary and are also representative of the Media Arts Rationale where they "use existing and emerging technologies as they explore imagery, text and sound and create meaning as they participate in, experiment with and interpret diverse cultures and communications practices (¶ 3). The film techniques, needed to create meaning are further explored below to illustrate how filmmakers emotionally cue an audience, thereby inviting them to emotionally 'feel' what the filmmaker has planned (Smith, 2003).

Mise-en-scène

Mise-en-scène, translated from French, means what is in the frame of the camera or what is captured by the lens onto the film or camera sensor. Students need to understand that mise-en-scène includes the setting chosen or the set the production designers have created. It also includes what the actors are wearing, the lighting and props used (Pierson, 2013). Understanding these choices are intentional to achieve the feeling or perspective the filmmaker is trying to convey, is critical. Consider the powerful 30 second Australian Commercial, *Hey mate, we can do something to stop violence against woman* by WhiteRibbon, Australia's Campaign to Stop Violence Against Women. Figure 1 illustrates the Mise-en-scène from the commercial. The offender in the film is talking nonchalantly about hitting his girlfriend, "It happens all the time, I just give her backhand. It usually shuts her up." The setting, lighting and props highlight how it is ordinary men who are perpetrating violence against woman. "A rich and complex Mise-en-scène activates the viewer's entire sensorium." (Redmond, 2014 p.2).

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Figure 1. Mise-en-scène from *Hey mate, we can do something to stop violence against women*

Elements of Mise-en-scène can create an emotional cue, an example being the colour used in a scene. In western cultures the colour red is a symbol for danger, aggression, passion and sexuality. Figure 2 shows how lighting the set has created a deep reddish hue, attempting to cue an emotion of anxiety in viewers. The use of color can also show transitions, such as the red sets used in the beginning of the film *The Last Emperor* (Bertolucci & Thomas, 1987). As the emperor learns his purpose at the climax of the film, the colors of all the scenes and sets turn to green, the color of fertility. Furthermore, color can be used in a film to show characters or an idea. Darth Vader's red light sabre in the *Empire Strikes Back*, (Kershner & Luca, 1980) is immediately associated with evil. These are examples of the film techniques children and young people need to learn to produce high quality productions and digital solutions that evoke emotions in learners.

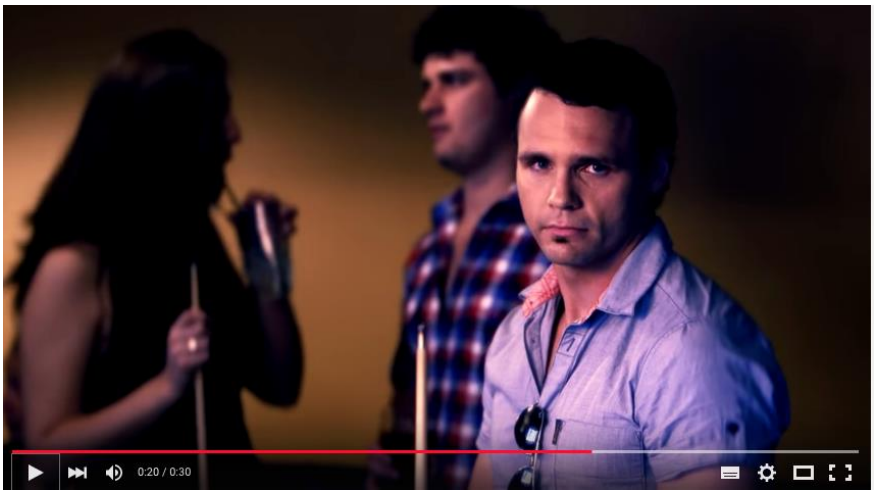

Figure 2. Mise-en-scène from *Hey mate, we can do something to stop violence against women*

Cinematography

Cinematography is often cited as 'writing in the moment', where the focus is on how a scene is being shot (Pierson, 2013). Children and young people can easily learn how to exploit the affordances of cinematography through overt instruction (New London Group, 2000) using the films of Alfred Hitchcock. For example, Hitchcock uses a close-up shot of a face to show the emotion a character might be feeling so much so that "drama emerges from the emotions and thoughts shown on a character's face" (Markle & CBC Television, 1964). Hitchcock also uses low camera shots in his

films to create the impression of power and high shots to create the impression of smallness or weakness. Wide shots are used to establish scenes or create impressions of loneliness or awe at a scene (Mollison, 2003). The use of light is critical in cinematography with academy award winner John Alton (2014) describing how cinematographers 'paint with light' to provide emotional cues for audiences. For example, a dark gloomy shot adds suspense to a scene, but can also provide an emotional cue of fear (Plantinga & Smith, 1999).

Figure 3. Cinematography in *Hey mate, we can do something to stop violence against women*

Cinematography in *Hey mate, we can do something to stop violence against woman* is crucial to the learning message. The opening medium 'over-the-shoulder' shot, invites viewers to vicariously join the group at the bar table (Figure 1). The viewer becomes part of the group hearing the antagonist speak. The next series of shots starts with objective views of the protagonists looking at each other and the viewer (Figure 3), as they agree how offensive the comment is. This invites the viewer to also agree with the protagonists.

Figure 4. Cinematography from *Hey mate, we can do something to stop violence against women*

The camera is taking a subjective point of view stance, where the viewer now is one of the 'blokes' being asked to agree to a course of action by being directly looked at (Figure 4). This camera shot or cinematography cues the emotion of anxiety. This is enhanced by the narrator saying in deep authoritative voice, "There is something you can do about it. Thousands of good men have got your back". The closing shot then shows the antagonist looking down in embarrassment (Figure 5). The cinematography is powerful because of the use of close-up shots which helps cue the emotions the

actors are showing in the viewers themselves (Hithcock, 1946). Close-ups also help male viewers identify with the characters in the film, because they can see them clearly, again helping emotional cueing (Igartua, 2010).

Figure 5. Cinematography in *Hey mate, we can do something to stop violence against women*

Music

Music is also well known for its ability to activate emotions (Cohen, 2001). When music is combined with images, emotional cueing is enhanced (Plantinga & Smith, 1999). Neuroscience provides photographic evidence of the brain 'lighting up' in response to music. Blood flow is increased to the reward areas of the brain when it is stimulated by music. Bernard Herman used music to activate emotions in Hitchcock's '*Psycho'* with jarring strings and brass to recreate the sounds of animals in panic (Stewart, 2015). The use of music in Hitchcock's films was also commented on by the celebrated director Martin Scorsese talking about film scores that stood out, during a BBC interview (BBC4, 2013).

> Two or three key scores one was Psycho not necessarily the screeching violence it was the other music the 'waiting' music – the music where you knew something terrible was going to happen you know somehow this energy is building up and you are suppressing it. And Vertigo, particularly the driving sequences when driving around …That music stayed with me, no it didn't stay with me I could not hum it, could not think what it was, but when I heard it I immediately knew that world, knew that mood, knew that emotional state and psychological state really.

Students need overt instruction about how music is used to in films to activate emotions. In the *Hey mate, we can do something to stop violence against woman* commercial, which lasts for just 30 seconds, at 13 seconds, disjointed and unsettling music is added, which is designed to cue the emotion of disgust at the comment of the antagonist. The use of music in the short commercial demonstrates how emotions can be activated through music.

Narrative

The narrative element of film is the story it tells. When creating productions, the technique of storyboarding is used to visualise the story, breaking it down into individual camera shots and grouping them into act structures. Central to the story is the characters and their roles as protagonist and/or antagonist within a standard three-act structure of films (Parmaggiore & Wallis, 2005). The three act structure is as follows:

> Act 1: Exposition leads to turning point.

Act 2: Complications lead to climax and
Act 3: Action leads to resolution

Figure 6, illustrates a three act structure plot line for a 90-minute film and details a typical story of hero overcoming challenges to resolve the story (Mollison, 2003).

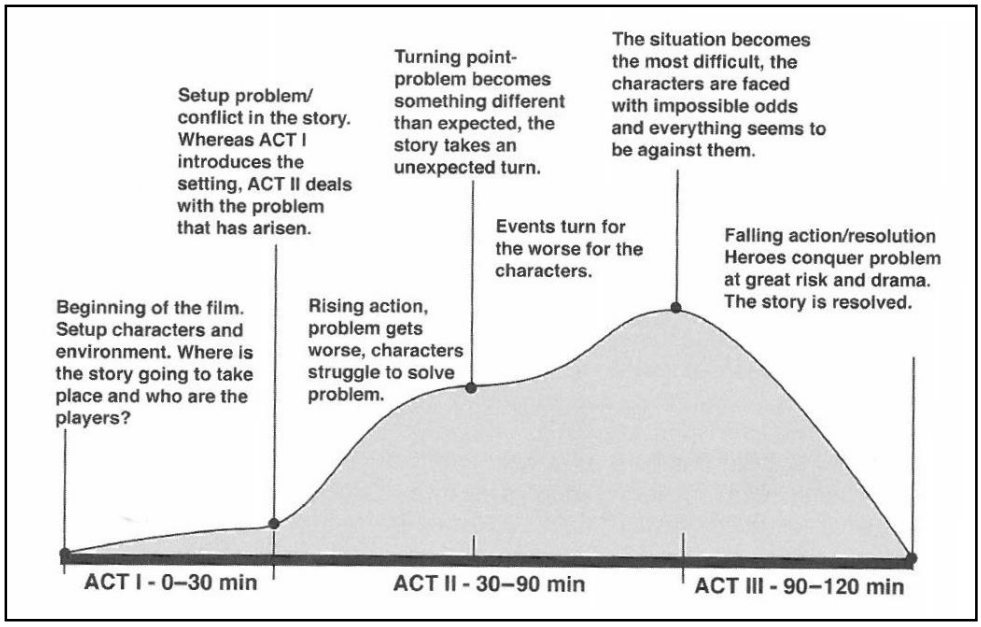

Figure 6: Example Three Act structure plot line

The story of *Hey mate, we can do something to stop violence against woman* is also split into three acts. The first act introduces the characters, ordinary blokes, chatting in the pub over a few beers. This is a atypical scene in many Australian communities. The antagonist is introduced as a 'normal' bloke making an offhand comment about slapping his partner. The second act, introduces the conflict of the story, the surprise by the other blokes, looking at each other, querying each other's response to the antagonist's comment. The final act is the resolution to make a stand against domestic violence against females. The story is resolved with the commercial asking viewers (e.g. regular blokes), "So wear an oath this White Ribbon day to put a stop to violence against women."

The three act structure creates drama of the film, drama can hold the attention of the audience. Drama can also provide the audience with vicarious experiences, including learning (Roberts, 2010), allowing them to feel and express emotions that they might otherwise have to repress in real-life (De Fossard & Riber, 2005). The three act structure plot line is incredibly easy to teach and even easier to find examples of. Teachers, regardless of their subject area, can provide a quick mini-lesson on the narrative in films and storyboarding that can potentially transform student's processes and production skills, whether they are in the foundation year where they are working with others to create, organize and share ideas or in year 10 where they are creating interactive solutions alone or with peers.

Editing

Unique to the medium of film is editing. An editor's job is to piece together film clips and music using time and continuity to tell the story. The academy award winning film editor Walter Murch in his seminal film theory book *In the Blink of an Eye* (Murch, 1992) discusses six cuts that fulfill his criteria of a good cut between different film images:

- being true to the emotion of the moment;
- how the cut advances the story;
- is rhythmically interesting;

- follows an eye-trace – where a character is looking;
- the 'planarity' of the scene; and
- how the cut respects the dimensionality of where the characters are in relation to each other.

Murch (1992) justifies the order of his criteria:

> At the top is emotion… because it's the hardest to define and deal with 'How do you want your audience to feel?'… What they finally remember is not the editing, not the camerawork, not the performances, not even the story – it's how they felt. (p. 22).

The art of editing, assembling together different camera shots, adding music, sound effects and graphic elements, while keeping the narrative of the story intact is a skill unique to film-making. In *'Hey mate, we can do something to stop violence against women'* the editing helps create the emotional cues, by combining the other formal elements of film. The film opens with a graphic element supported by deep male voice introducing the topic of the film (Figure 7). The next cut is to the establishing shot of the bar scene. Henceforth the editing follows the eye traces of the actors as they look at each other. An actor will look at another; the editor will then cut to other actor, following their eye traces. To enhance the emotions cued, temporal adjustments have also been made, slow motion is used to emphasize frowns and facial expressions. The film flows smoothly because the editor has also used the technique of editing on action, following the movements of actor's heads when turning, this creates seamless transitions between the shots. The quality of editing in *'Hey mate, we can do something to stop violence against women'* meets Murch's (1992) criteria for editing good cuts together. The editor has used all of the film techniques to create a powerfully moving piece. These can easily be taught to children and young people in schools to enhance the production of their films and digital media.

Figure 7: The art of editing

Educational films, such as '*Hey mate, we can do something to stop violence against women'* can activate a range emotions. In order to analyse the film from these emotions, we need to also be aware that an individual viewer's age (Ross & Mirowsky, 2008), gender (Bianchin & Angrilli, 2012), cultural background (Chentsova-Dutton & Tsai, 2007; Schaefer, Nils, Sanchez, & Philippot, 2010a), topic interest (Pekrun et al., 2002), and identification with character(s) in the film (Igartua, 2010) will impact on the emotions experienced by a viewer. In this case the 'target' of the commercial are males over the age of 18 from a white working class or middle class cultural background. Asking a subject who meets these criteria to assess the emotions through self-reporting they feel when viewing 'Hey mate, we can do something to stop violence against women,' might produce the following results. The emotion of anger might be cued due to the topic being confronting and then the frustration of seeing the antagonist describing how he treats women. Perhaps, followed by the emotion of enjoyment

where the protagonist took a stance. However, while this analysis is a useful starting point, it does not suggest where learning might or might not be supported during the viewing of the film.

Academic Emotions

The study of human emotions and learning is complex, with emotional researchers having differing opinions. The emotional researcher Robert Plutchik (2001a) explains:

> The reason behind this is that the language of emotions is so broad, with hundreds of different words to describe various emotional states… Complicating the topic of emotion further is the plethora of theories of emotion whose authors interpret the role of emotion in life very differently" (p. 344).

However, whilst complex, research into the relationships between emotions and learning, has generated a significant body of work. The field of academic emotions, emerging from Pekrun's (1992) paper titled the 'Impact of Emotions on Learning and Achievement: Towards a theory of cognitive/motivational mediators' provides an insight into the emotions experienced by learners. Pekrun et al. (2002) argue the emotions commonly experienced by learners when they are in the classroom environment, during studying and when taking exams are:

- enjoyment;
- hope;
- pride;
- relief;
- anger;
- anxiety;
- shame;
- hopelessness; and
- boredom

In later work, Pekrun et al. (2007) drew together the diverse range of academic emotions designing a taxonomy with the three dimensions of valence (positive/negative), physiological activation (high/low) and Task/Activity or outcome (pleasant/unpleasant), when describing those emotions that relate to achievement and learning in academic settings: Table 1 illustrates the relationships between academic emotions and the three dimensions.

	Positive[a]		Negative[b]	
Object Focus	Activating	Deactivating	Activating	Deactivating
Activity Focus	Enjoyment	Relaxation	Anger Frustration	Boredom
Outcome Focus	Joy Hope Pride Gratitude	Contentment Relief	Anxiety Shame Anger	Sadness Disappointment Hopelessness

[a]Positive, pleasant emotion; [b]Negative, unpleasant emotion.

Table 1: Pekrun et al (2007). A Three-Dimensional Taxonomy of Achievement Emotion

Table 1, also illustrates Pekrun et al.'s (2007) four broad categories of emotions associated with activities that focus on learning: enjoyment; relaxation; anger/frustration; and boredom. Pekrun et al (2007) assigned each of these emotions with an attribute of positive or negative. This dimensional view of emotions is often arranged as a circumplex, with valence between emotions. A circumplex approach can take into account the level of the activation of an individual's emotions. (Feldman,

Barrett & Russel, 1998). Figure 8 illustrates Pekrun et al's (2007) task or activity emotions placed into a circumplex model. Activating emotions are on top, deactivating emotions on the bottom. The positive emotions are on the left hand side and the negative emotions are on the right hand side.

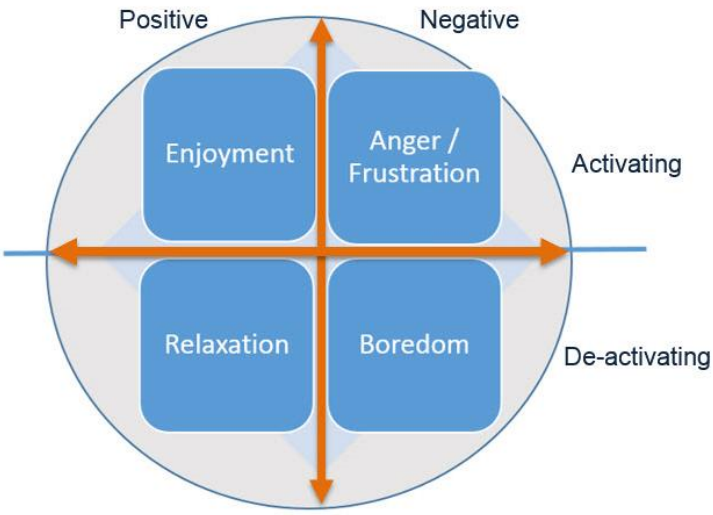

Figure 8: Circumplex of task / activity emotions

Shuman & Scherer (2014) argue the broad categories contained in circumplex models are used "to assess discrete emotions that are then aggregated according to superordinate dimensions, factors or clusters" (p.27). In this case the aggregation of the emotions that comprise the broad categories of emotions shown in Figure 8 are:

- *positive activating:* enjoyment
- *positive deactivating:* relaxation
- *negative activating*: anger/frustration
- *negative de-activating*; boredom

If students are aware of how film techniques can activate emotions in viewers, and how these emotions support or do not support learning they will be better placed to design powerful productions that emotionally support their learning message, similar to the 30 second commercial *Hey mate, we can do something to stop violence against women.* When students have a broad understanding of academic emotions they realise:

- the positive activating emotion of enjoyment can potentially improve learning outcomes and holistic creative ways of thinking (Pekrun et al., 2002a);
- the positive de-activating emotion of relaxation tends to foster disengagement (Linnenbrink, 2007);
- the negative de-activating emotion of boredom is disengaging and likely to, reduced learning outcomes due to lack of engagement (Pekrun, Goetz, Titz, & Perry, 2007; Tulis & Fulmer, 2013);
- the negative-activating emotion of anger can be a motivating (Harmon-Jones, Harmon-Jones, Abramson, & Peterson, 2009) at a low level of activation; and,

When viewing *'Hey mate, we can do something to stop violence against women'* from the perspective of academic emotions on a broad scale, such as the circumplex model above, the emotions the film activates to get across its educational message are more specific. The film techniques in the 30 second

commercial activate a number of emotions that are more a subset of the four broad academic emotions. For example, the other emotions activated might include: *embarrassment* where an abuser of females is known to the viewer; *guilt* because a viewer might not have acted to stop the abuse of females in the past; or even *scared* (meaning they may have committed such an act themselves and can be punished). Therefore using the broad categories of academic emotions does not provide enough detail to assess a film clip of its ability to activate academic emotions that might support of or not support learning. However, using the broad categories of activity emotions and creating sub-categories from the emotional categories used when rating films for their ability to activate different emotions (Schaefer, Nils, Sanchez, & Philippot, 2010) could provide teachers and students with a tool to both guide the design of, and evaluation of digital media such as films. Stephen designed the *Wheel of Academic Emotions* to assist educational filmmakers, like himself, in better understanding if their films activated the emotions they had hoped for, or whether their film techniques were correctly cueing the emotions the filmmakers' wanted them to in viewers.

Wheel of Academic Emotions (WAE)

The WAE was designed for use by educational film producers as a self-report to use with their viewers (Figure 9). The process of creating the WAE required firstly, grouping the emotions used by emotional researchers when activating emotions in their subjects using film clips (Schaefer, Nils, Sanchez, & Philippot, 2010) and academic emotions (Pekrun et al., 2007). This led to the design of the self-report tool that can be used in a variety of ways by teachers and students. Students can use WAE to think about what emotions they want their productions or digital solutions to cue or achieve in users and why. For example, they may desire to cue low levels of *anxiety* to focus viewers on an issue like environmental destruction. Or they may strive to cue high lives of *enjoyment* or surprise to highlight what happens when citizens take steps to address the destruction of the environment in their communities. This coupled with knowledge of film techniques can potentially assist them in producing productions that achieve their learning goals embedded within their digital solutions. On the other hand, they can use the wheel with peers as a simple self-report tool to evaluate their productions, or even as a collaborative dialogic tool to foster critical discussions among peers in regards to their productions and the extent to which they did/did not cue the desired academic emotions.

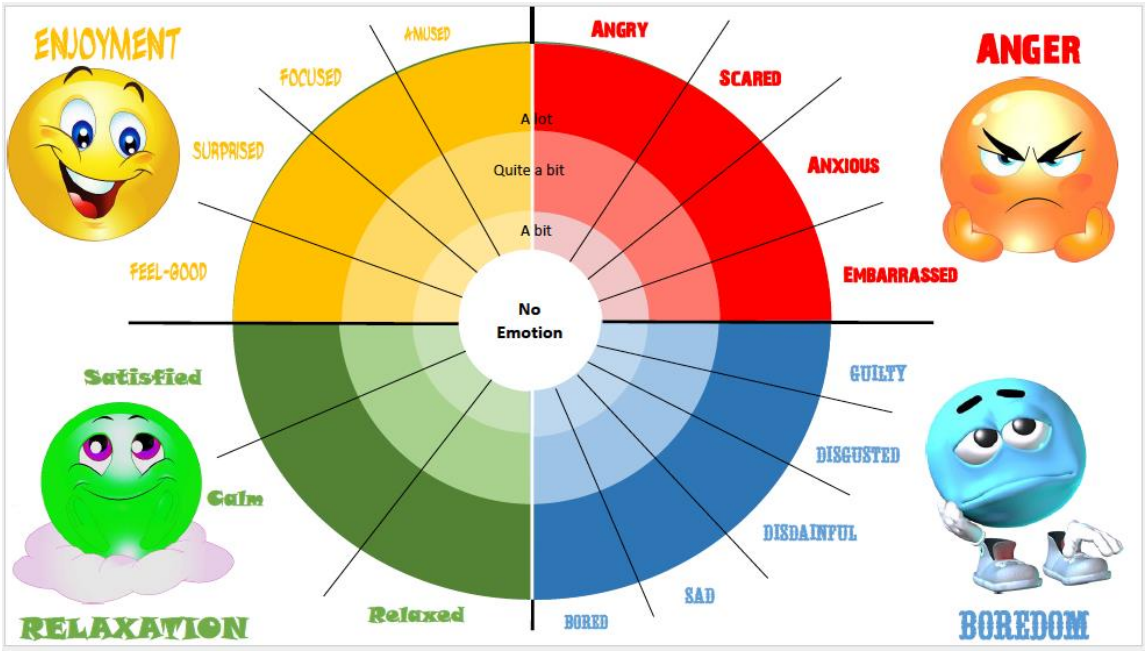

*Figure 9***:** Wheel of Academic Emotions (WAE)

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Selecting emotional categories for the WAE

The emotional categories selected for the WAE are drawn from the four broad categories of academic emotions (Perkun, 2002) and additional emotional categories used by emotional researchers when activating different emotions in their subjects using film clips. Theses emotional sub-categories were selected from the categories used in the Extended Positive and Negative Affect Schedule (Watson & Clark, 1994), the Differential Emotional Scale (Izard, Dougherty,Bloxom, & Kotsch, 1974). The emotions were then grouped into positive and negative categories using Schaefer et al.'s (2010) categorisation. Whether an emotion was activating or de-activation was determined by ascertaining which emotional family an emotion belonged (Parrot, 2001; Siegert, Bock, Vlasenko, Philippou-Hubner, & Wendemuth, 2011). From this, subcategories of academic emotions were listed (Table 2) to highlight the relationships between those emotions and the broader 4 categories of academic emotions. The distribution highlights their dimensions of valence (positive/negative) and the physiological activation (high/low), as well as their activity and outcome focus (pleasant/unpleasant).

	Positive[a]		*Negative*[b]	
	Activating	De-activating	Activating	De-activating
Activity focus	Enjoyment	Relaxation	Anger / Frustration	Bored
Outcome focus	• Feel good • Surprised • Focussed • Amused	• Satisfied • Calm • Relaxed	• Anger • Scared • Anxious • Embarrassed	• Guilty • Disgusted • Disdainful • Sad • Bored
	[a]Positive, pleasant emotion		[b]Negative, unpleasant emotion	

*Table 2**: Expanded Taxonomy of Academic Emotions***

Design influences

The design is based upon the circumplex of activity emotions described above. Emotional groupings were coloured to aid identification drawing from Plutchick's (1980) *Emotional Wheel*. The level of activation—a bit, quite a bit or a lot—of an emotion uses the categories from the C^{2}Learn Creativity Wheel (Craft, Chappell and Walsh 2014). Emoticons were added to aid users in quickly identifying the broad emotional categories, proven to be a more efficient aid to identifying categories than text-based labels (Feidakis, Daradoumis, Caballé, & Conesa, 2014),

Conclusion

The aim of the WAE is to encapsulate and expand the academic emotions from Pekrun et al.'s (2002) three dimensional taxonomy by combing academic emotions (activity focus) with emotional categories (outcome focus) used by emotional researchers. This self-report and peer assessment tool uses a similar set of principles that underpin Craft, Chappell and Walsh's C^{2}Learn Creativity Wheel. The following points can be said to characterise the WAE:

- It is not a checklist;
- It is a way of involving students alongside teachers in the assessment process of films, digital media and creative solutions;
- Is a way of allowing students and teachers to reflect on their creative designs and innovative solutions;
- It is way to assist students' in understanding how their multimodal design can be used to cue different emotions in viewers;
- It is structured to represent a particular way of reporting on the emotions activated by film

techniques used to produce digital media (a bit, quite a bit, a lot) in a simple language; and
- Is divided into sections which represent the four broad categories of academic emotions.

We argue students' (and teachers') understanding—broadly—of the field of academic emotions can assist them in producing provocative and engaging digital solutions. We are not advocating that our goal is to teach students to understand the very complex and contested field of emotions. Rather, we believe they can come to understand how certain film techniques work to activate specific emotions in viewers. From a filmmaker's perspective, films are produced to encourage an emotional reaction or response from audiences (Smith, 1999). We believe the theory of academic emotions can be better understood by students and teachers through the use of the WAE and that it can assist students in designing, creating, managing and evaluating "sustainable and innovative digital solutions to meet and redefine current and future needs" (ACARA, n.d., ¶ 2). If children and young people have an understanding of the emotions they want to activate in audiences through their multimodal design of digital media, they can draw on the field of academic emotions and use their design thinking to create unique and proactive digital solutions. By understanding how different film techniques can be used to activate those emotions, and knowing what emotions potentially deactivate learning, students stand a better chance at producing digital content that is effective in supporting the learning messages they intend to convey through design thinking.

References

Anton, G., & Barany, A. (2013). POWER OF PLAY: EXPLORING COMPUTATIONAL THINKING THROUGH GAME DESIGN. *Velvet Light Trap: A Critical Journal Of Film & Television*, (72), 74-75. doi:10.7560/VLT7207

Apperley, T., and Walsh, C.S. (2012). What digital games and literacy have in common: A heuristic for understanding pupils' gaming literacy. *Literacy*, Vol. 46, pp. 115–122. DOI:10.1111/j.1741-4369.2012.00668.x ISSN: 1741-4369 (Contribution: 50%)

Bandura, A.,& Cervone, D. (1983). Self-evaluative and self-efficacy mechanisms governing the motivational effects of goal systems. Journal of Personality and Social Psychology, 45, 1017–1028.

BBC 4. (2013). *Web exclusive: Martin Scorsese on seeing Psycho and Vertigo*. Retrieved from http://www.bbc.co.uk/programmes/p01g5z83

Bers, M. U., Flannery, L., Kazakoff, E. R., & Sullivan, A. (2014). Computational thinking and tinkering: Exploration of an early childhood robotics curriculum. *Computers & Education*, *72*145-157. doi:10.1016/j.compedu.2013.10.020

Bertolucci, B. (Director). & Thomas, J. (Producer). 1987 *The Last Emporer* [Motion picture]. China: Columbia Pictures

Bianchin, M., & Angrilli, A. (2012). Gender differences in emotional responses: A psychophysiological study. *Physiology & Behavior*. http://doi.org/10.1016/j.physbeh.2011.10.031

Burnett, C. (2014). Investigating pupils' interactions around digital texts: a spatial perspective on the "classroom-ness" of digital literacy practices in schools. *Educational Review*, *66* (2), 192-209. doi:10.1080/00131911.2013.768959

Carroll, Maureen, Goldman, Shelley, Britos, Leticia, Koh, Jaime, Royalty, Adam, & Hornstein, Michael. (2010). Destination, Imagination and the Fires Within: Design Thinking in a Middle School Classroom. (Report). *International Journal of Art & Design Education*,*29*(1), 37.

Chentsova-Dutton, Y. E., & Tsai, J. L. (2007). Gender differences in emotional response among European Americans and Hmong Americans. *Cognition & Emotion*, *21*(1), 162–181. doi:10.1080/02699930600911333

Cira, N. J., Chung, A. M., Denisin, A. K., Rensi, S., Sanchez, G. N., Quake, S. R., & Riedel-Kruse, I. H. (2015). A Biotic Game Design Project for Integrated Life Science and Engineering Education. *Plos Biology, 13*(3), 1-8. doi:10.1371/journal.pbio.1002110

Cohen, A. (2001). Music as a source of emotion in film. In *Music and Emotion* (pp. 249–272).

Craft, A., Chappell, K., and Walsh, C.S. (2014). Deliverable 2.2.2: C2Learn Learning Design for Creative Emotional Reasoning (CER). O C2Learn: Creative Emotional Computational Tools Fostering Co-Creativity in Learning Processes.

Dates, F. F., Mountain, B., & Movies, H. (2010). *Film Theory and Contemporary Hollywood Movies*. *Popular Communication* (Vol. 8). doi:10.1080/15405701003691328

De Fossard, E. (2008). Using edu-tainment for distance education in community work. SAGE Publications India Pvt Ltd

De Fossard, E., Riber, J.(2005); Writing and Producing for Television and Film. SAGE Publication India

Douek, J. (2013). Music and emotion-a composer's perspective. *Frontiers in Systems Neuroscience*, *7*(November), 82. doi:10.3389/fnsys.2013.00082

Dunkerly-Bean, Judith, Bean, Thomas, & Alnajjar, Khaled. (2014). Seeking Asylum: Adolescents Explore the Crossroads of Human Rights Education and Cosmopolitan Critical Literacy. *Journal of Adolescent & Adult Literacy, 58*(3), 230-241.

Emert, Toby. (2013). "The Transpoemations Project": Digital Storytelling, Contemporary Poetry, and Refugee Boys. *Intercultural Education*, *24*(4), 355-365.

Feldman Barrett, L., & Russell, J. A. (1998). Independence and bipolarity in the structure of current affect. Journal of Personality & Social Psychology, 74, 967-984.

Feidakis, M., Daradoumis, T., Caballé, S., & Conesa, J. (2014). Embedding emotion awareness into e-learning environments. International *Journal of Emerging Technologies in Learning*, *9*(7), 39–46. doi:10.3991/ijet.v9i7.3727

Hague C and Payton S 2010, *Digital literacy across the curriculum: a futurelab handbook*. Bristol, United Kingdom: Futurelab.

Harlow, D, & Leak, A 2014, 'Mapping students' ideas to understand learning in a collaborative programming environment', *Computer Science Education*, 24, 2/3, pp. 229-247, Academic Search Complete, EBSCO*host*, viewed 11 August 2015.

Haselton, M.G. & Ketelaar, T. (2006). Irrational emotions or emotional wisdom? The evolutionary psychology of emotions and behavior. In J. P. Forgas (Ed.), *Hearts and minds: Hearts and minds: Affective influences on social cognition and behavior* (pp. 21-40). New York: Psychology Press.

Harmon-Jones, E., Harmon-Jones, C., Abramson, L., & Peterson, C. K. (2009). *PANAS positive activation is associated with anger. Emotion (Washington, D.C.)* (Vol. 9).

Heavey, C. L., Adelman, H. S., Nelson, P., & Smith, D. C. (1989). Learning problems, anger, perceived control, and misbehavior. *Journal of Learning Disabilities*, *22*(1), 46–50. http://doi.org/10.1177/002221948902200109

Hembree, R. (1988). Correlates, causes, effects, and treatment of test anxiety. *Review of Educational Research*, 58, 47–77

Hepple, Erika, Sockhill, Margaret, Tan, Ashley, & Alford, Jennifer. (2014). Multiliteracies Pedagogy: Creating Claymations with Adolescent, Post-Beginner English Language Learners. *Journal of Adolescent & Adult Literacy, 58*(3), 219-229.

Markle, F (Director). (1964) A talk with Hitchcock [*Telescope*]. CBC Television (Producer). USA: CBC Television

Igartua, J. J. (2010). Identification with characters and narrative persuasion through fictional feature films. *Communications*, *35*(4), 347–373. doi:10.1515/COMM.2010.019

Izard, C. E., Dougherty, F. E., Bloxom, B. M., & Kotsch, N. E. (1974). The Differential Emotions Scale: A method of measuring the meaning of subjective experience of discrete emotions. Nashville, TN: Vanderbilt. University, Department of Psychology.

Jacobs, G. E. (2012). Rethinking Common Assumptions About Adolescents' Motivation to Use Technology In and Out of School. *Journal Of Adolescent & Adult Literacy*, *56*(4), 271-274. doi:10.1002/JAAL.00139

Jewitt, C. (2008). Multimodality and Literacy in School Classrooms. *Review of Research in Education*, 32, 241-267.

Kangas, Kaiju, Seitamaa-Hakkarainen, Pirita, & Hakkarainen, Kai. (2013). Design Thinking in Elementary Students' Collaborative Lamp Designing Process. *Design and Technology Education, 18*(1), 30-43.

Kershner, I. (Dirctor). $ Lucas, G. (Producer). 1980 The Empire Strikes Back [Motion picture] USA: LucasFilms Ltd.Levido, Amanda. (2014). Making documentary films: Introducing the new leaders! *Literacy Learning: The Middle Years, 22*(3), Literacy Learning: The Middle Years, Oct, 2014, Vol.22(3).

Linnenbrink, E. A. 2007. "The Role of Affect in Student Learning: A Multi-Dimensional Approach to Considering the Interaction of Affect, Motivation, and Engagement." In Emotion in Education, edited by P. Schutz and R. Pekrun, 107–124. Amsterdam: Elsevier.

Levido, Amanda. (2014). Making documentary films: Introducing the new leaders! *Literacy Learning: The Middle Years, 22*(3), Literacy Learning: The Middle Years, Oct, 2014, Vol.22(3).

Marsh, J. (2006). Emergent Media Literacy: Digital Animation in Early Childhood. *Language and Education,20*(6), 493-506.

Mollison, M. (2003). *Producing videos, A complete Guide, Second Edition*. Sydney: AFTRS.

Murch, W. (1992). *In The Blink Of An Eye*: a perspective on film editing. 2nd Edition.Los Angeles, USA: Silman-James Press.

New London Group (2000) in Cope, B. and Kalantzis, M. (eds) (2000) in *Multiliteracies: Literacy Learning and the Design of Social Futures*, Oxon and New York, Routledge.

Nixon, Helen & Comber, Barbara (2005) Behind the scenes : making movies in early years classrooms. In Marsh, Jackie (Ed.) *Popular culture, new media and digital literacy in early childhood.* RoutledgeFalmer, United Kingdom, pp. 219-236.

Owston, Ron, Herb Wideman, Natalia Sinitskaya Ronda, and Christine Brown. 2009. "Computer game development as a literacy activity." *Computers & Education* 53, no. 3: 977-989. *Academic Search Complete*, EBSCO*host* (accessed August 11, 2015).

Pramaggiore, M., & Wallis, T. (2005). *Film*. London: Laurence King.

Parrott, W. (2001*) Emotions in Social Psychology*, Psychology Press, London.

Pierson, T. (2013). The Five Formal Elements of Film: How to Critically Evaluate Movies. Retrieved from http://collinsvillelibrary.blogspot.com.au/2013/03/the-five-formal-elements-of-film-how-to.html

Pekrun, R. (1992). The Impact of Emotions on Learning and Achievement: Towards a Theory of Cognitive/Motivational Mediators. *Applied Psychology*, *41*(4), 359–376. doi:10.1111/j.1464-0597.1992.tb00712.x

Pekrun, R., Goetz, T., Titz, W., & Perry, R. P. (2002). Academic Emotions in Students' Self-Regulated Learning and Achievement: A Program of Qualitative and Quantitative Research. *Educational Psychologist*. doi:10.1207/S15326985EP3702_4

Pekrun, R., Goetz, T., Perry, R. P., Kramer, K., Hochstadt, M., & Molfenter, S. (2004). *Beyond test anxiety: Development and validation of the test emotions questionnaire (TEQ)*. *Anxiety, Stress & Coping* (Vol. 17). doi:10.1080/10615800412331303847

Pekrun, R., Frenzel, A. C., Goetz, T., & Perry, R. P. (2007). The Control-Value Theory of Achievement Emotions. An Integrative Approach to Emotions in Education. *Emotion in Education*, 13–36. doi:10.1016/B978-012372545-5/50003-4

Plantinga, C., & Smith, G. (1999). *Passionate views*. Baltimore: Johns Hopkins University Press

Plutchik, R. (1980), *EMOTION: A Psychoevolutionary Synthesis*, Harper & Row

Plutchik, R. (2001), Integration, Differentiation, and Derivatives of Emotion, *Evolution and Cognition*, Vol. 7, No. 2

Plutchik, R. (2001), That Nature of Emotions: Human emotions have deep evolutionary roots, a fact that may explain their complexity and provide tools for clinical practice. *Sigma Xi, The Scientific Research Society*, vol. 89, No. 4, pp.344350

Redmond, S. (2014). Explainer: miseenscène. *The Conversation*. Retrieved from https://theconversation.com/explainer-mise-en-scene-27281

Roberts, D. (2010). Vicarious learning: A review of the literature. *Nurse Education in Practice*, *10*(1), 13–16. doi:10.1016/j.nepr.2009.01.017

Ross, C. E., & Mirowsky, J. (2008). Age and the balance of emotions. *Social Science and Medicine*, *66*(12), 2391–2400. http://doi.org/10.1016/j.socscimed.2008.01.048

Schaefer, A., Nils, F. F., Sanchez, X., & Philippot, P. (2010). Assessing the effectiveness of a large database of emotion-eliciting films: A new tool for emotion researchers. *Cognition & Emotion, 24*(March 2015), 1153–1172. doi:10.1080/02699930903274322

Shuman, V. & Scherer, K. (2014). Concepts and Structures of Emotions. *International Handbook of Emotions*. Ed. Pekrun, R. & Linnenbrinik-Garcia. New York: Taylor and Francis

Siegert, I., Bock, R., Vlasenko, B., Philippou-Hubner, D., & Wendemuth, A. (2011). Appropriate emotional labelling of non-acted speech using basic emotions, geneva emotion wheel and self assessment manikins. In *Proceedings - IEEE International Conference on Multimedia and Expo*.

Smith, G. (1999). Local Emotions , Global Moods , and Film Structure. *Passionate Views. Film, Cognition, and Emotion*, 103–126.

Smith, G. M. (2003). *Film Structure and the Emotion System.* Cambridge: Cambridge University Press.

Smith, T. J. (2005). An Attentional Theory of Continuity Editing. Institute for Communicating and Collaborative Systems School of Informatics University of Edinburgh.

Spielberg, S.(Director). & Zanuk, R., Brown, D. (Producers). (1975). *Jaws* [Motion picture]. USA: MCA Universal.

Stewart, B. H. (2015). BBC Arts & Culture - How do film-makers manipulate our emotions with music?, (September 2013), 2013–2016. Retrieved from http://www.bbc.co.uk/arts/0/24083243

Thompson, W. F. (2002). Evoking terror in film scores. *M/C: A Journal of Media and Culture*, *5*(1), 8–10.

Tulis, M., & Fulmer, S. M. (2013). Students' motivational and emotional experiences and their relationship to persistence during academic challenge in mathematics and reading. *Learning and Individual Differences*, *27*, 35–46. doi:10.1016/j.lindif.2013.06.003

Tylski, A. (2015). A Study of Jaws ' Incisive Overture To Close Off the Century, 1–4.

Watson, D., & Clark, L. A. (1994). T HE PANAS-X Manual for the Positive and Negative Affect Schedule - Expanded Form.

Valkanova, Y., & Watts, M. (2007). Digital story telling in a science classroom: Reflective self-learning (RSL) in action. *Early Child Development and Care*, *177*(6-7), 793-807.

Walsh, C. S. (2009). The multi-modal redesign of school texts. *The Journal of Research in Reading Special Issue on Literacy and Technology*, Vol 32, No 1, pp. 126-136. DOI: 10.1111/j.1467-9817.2008.01385.x ISSN: 1467-9817

Walsh, C.S. (2010). Systems-based literacy practices: Digital games research, gameplay and design. *Australian Journal of Language and Literacy Education*. Vol. 33, No 1, pp. 24-40. ISSN: 1038-1562

WhiteRibbonAust,. (2012). *Hey mate, we can do something to stop violence against women*. [Video File] Retrieved from https://www.youtube.com/watch?v=2HGmjJEGE1c

Williams, B. T. (2005). Leading double lives: Literacy and technology. *Journal of Adolescent & Adult*

Literacy, 48(8), 702-706.

Wolhwend, K. (2013). *Literacy playshop: new literacies, popular media, and play in the early childhood classroom.* New York: Teachers College Press.

Zeidner, M. (2007). Test anxiety in educational contexts: Concepts, findings, and future directions. In P. A. Schutz, & R. Pekrun (Eds.), *Emotion in education* (pp. 165–184). San Diego, CA: Elsevier Academic Press.