

# **SUPPORTING MULTIMODAL AND SOCIAL LITERACIES FOR STUDENTS WITH AUTISM THROUGH STUDENT-CREATED DIGITAL MEDIA**

Alyce Shepherd, Garry Hoban, Roselyn Dixon, & Pauline Jones  
*University of Wollongong*

## **Abstract**

Social skills and communication for students with Autism Spectrum Disorder (ASD) are a challenging area in spite of many years of research and interventions. Whilst the vast majority of strategies and interventions reported in the literature for students with ASD are teacher/expert-generated, this study focuses on the use of technology to create possibilities for students to develop their social and literacy skills. This paper reports on part of a larger study that explored the potential of seven high school students with ASD using a new form of video making called “Blended Digital Media”, which integrates video and still images with an audio narration, to digitally communicate their personal interests as a means of developing social and multimodal literacies. The research used a multiple case study design incorporating a range of qualitative methods to ascertain to what extent and with what implications students were able to create their own personal blended digital media about their interests. For the purpose of this paper, reported data focusses on the experiences of two of the seven student case studies. Findings revealed that students were able to combine various modes and media forms to create their own blended digital media, and that they could justify their media use based on an understanding of modal affordances. Students were also able to communicate a range of personal interests and respond to the interests of others in a social context as a result of making and sharing their blended digital media.

## **Background**

Individuals who have an autism spectrum disorder (ASD) exhibit social skill and communication impairments, alongside perseverative behaviours, and restricted patterns of interests and activities (American Psychiatric Association, 2000). The communicative and social skill impairments of individuals with autism are further compounded by additional challenges that arise from perspective taking, executive functioning, and self-regulation deficits (Bergeson et al., 2008; Hill, 2004; McCloskey, Perkins, & VanDivner, 2009). These deficits in school-aged children are often the target of many interventions and strategies. There has been an abundance of research concerning social and communication skill interventions for students who have ASD, using teacher-generated video modelling and Social Stories (Bellini & Akullian, 2007; Charlop et al., 2010; Chan & O’Reilly, 2008; Crozier & Tincani, 2007; McConnell, 2002; Mechling & Swindle, 2012; Quimbach et al., 2009; Wang & Spillane, 2009). Further, research concerning the use of expert-generated programs that integrate Social Story and video modeling strategies, including the use of computer-based teaching aides (Ploog et al., 2013; Sansosti & Powell-Smith, 2008), Power Point (Mancil, Haydon, & Whitby, 2009) and 2D animation software (Mandasari, Lu, & Theng, 2011), have also indicated favourable outcomes for students with ASD. However, despite the increasing value of self-regulated learning in the field of Special Education (Kim & Park, 2012; Lane et al., 2010; Mazzotti, Wood, Test, & Fowler, 2010), there is a limited body of research concerning the specific use of student-generated strategies to develop the social and communication skills of students who have ASD.

Social and communication difficulties have far reaching implications for the ways in which students with ASD function in the school setting. Specifically, with regards to literacy learning it is often the case that as a result of receptive and expressive language difficulties students with ASD may lack the skills of their non-autistic peers to interpret and communicate information in traditional oral

and written ways (Ricketts et al., 2013). Consequently it is necessary for teachers to engineer other ways to help students demonstrate what they know and provide students with a variety of ways to communicate understandings (Kluth, 2010). This education responsibility is promoted by the NSW Board of Studies (2012), as syllabus documents urge literacy educators of students with ASD to differentiate instruction to meet student needs and to provide diverse opportunities for them to engage with the meaning of texts, and demonstrate their understandings using various modes of communication. It is a requirement of the NSW 7-10 English Syllabus for all students (including those with special education needs) to develop skills composing and responding to multimodal texts created in and through different information and communication technologies, and to understand the effects of technology and the use of different modes on meaning (Board of Studies NSW, 2012).

Research regarding social and communication skill interventions for students with ASD suggests that utilising strategies that integrate various modes, in particular visual technologies, can support the learning of these students (Bellini & Akullian, 2007; Bernad-Ripoll, 2007; Litras, Moore, & Anderson, 2010). Nevertheless, there is little research regarding the ways in which such technologies and the use of teaching approaches that use a computer-based format can support students' learning (Ploog et al., 2013; Sansosti, & Powell-Smith, 2008). Moreover, whilst the use of technology creates the possibility of combining different ways for developing social, communication, and literacy skills, the vast majority of strategies and interventions reported in the literature for students with ASD are teacher/expert-generated. Shepherd, Hoban and Dixon (2012) suggest that there is promise for students creating their own digital multimodal texts to enhance skills, understandings and communicative behaviours.

An innovative approach that involves students creating their own digital representations through the integration of different modes of communication is "blended media". By definition, blended media constitutes any combination of animation, images and video, and involves the purposeful mixing and matching of different media forms to suit a particular narration (Hoban, Nielsen & Shepherd, 2013). Developed as a creative way to engage students in the communication of science content (Hoban, 2005; Hoban, Nielson & Shepherd, 2013) blended media may similarly benefit the social and multimodal literacy development of students with ASD.

The purpose of this research is to explore the extent by which seven secondary students with autism can use digital media to communicate their ideas in different modes, and how composing their own blended digital media can support their development of multimodal literacy and social skills. Specifically this paper considers the first of three research questions from a broader study that addresses: (i) To what extent can students create their own personal blended digital media about their interests?; (ii) To what extent does utilising an array of modes to create blended digital media support students' multimodal literacy development?; and (iii) What are the social implications of students creating blended digital media about their interests? In addressing research question one; this paper presents findings in relation to the experiences of two of the participating seven student case studies: Charlie and Riley.

## Method

### Design of the Study

This qualitative study employed a multiple case study design that views students as independent cases within a program-based project carried out in the authentic environment of the high school setting (Creswell, 2007; 2009; Mertens, 2010). Qualitative methods of inquiry were used to track the experiences of seven students from years 7-12 who have an ASD over a series of three lessons that involved students creating their own blended digital media about their interests. To create their own blended digital media, each individual case study was given an iPad to take home over a weekend to capture images and video data that represented their interests. Upon returning to school with their media, students uploaded, edited and narrated their blended digital media independently over a period of three 40 minute lessons. Students then shared what they created with their peers.

## Selection of Participants

This study took place with seven adolescent high school students from years 7-11 who have ASD from an autism support class at a local Sydney high school. Each student was male, between the ages of 13 and 17, diagnosed as having high functioning autism, and expressed unique autistic characteristics, abilities, and interests. The students had been withdrawn from mainstream classes and placed into a support class because they lacked the social coping strategies and experienced challenges in relation to managing anxiety, interacting with peers, and following particular school routines. The role of the autism support class was to equip students with the necessary skills to function efficiently in the school classroom environment. The overarching goal of the class was to provide appropriate academic and social supports that can assist students with coping strategies that can be applied in both the autism unit and in mainstream classes in which they had been integrated.

For the purpose of the study, the seven student case studies that participated in the research constituted a purposive sample as their selection was intentional as opposed to random (Mertler & Charles, 2005). School and class selection was based on the expressed interest of the school's Head of Special Education Support unit teacher during a meeting with the researcher regarding the potential of using digital media to develop the communication and literacy skills of students in the autism support class. It had been observed (six weeks prior to the study) that students experienced significant difficulties with regards to clearly communicating their interests and recounting details from their weekends to their peers as part of news/sharing time. Further, students expressed a lack of interest in the experiences of others as evidenced by students looking away while other students were speaking, talking to other students, humming, and verbally expressing a lack of concern or interest. A few students who did express their interests found it hard to articulate themselves and spoke in circles, often repeating themselves and focusing on intricate details pertaining to one specific field of interest (e.g. trains or death metal). As is a trait of individuals who have ASD, these students lacked the social awareness or ability to read the audience and pick up on social cues that indicate that others may not share the same interests as them or wish to hear about them in such extensive detail.

While the students were very capable with regards to using computers and had even experienced jointly constructing movies as a class prior to the study, this study marked the first time that the students had independently created their very own blended digital media.

## Data Collection

Methods used to gather data for this study consisted of a combination of behaviour and lesson observations, semi-structured student interviews, and student work samples. Data were gathered across two phases and collection methods were designed to capture information addressing specific aspects of the study's research questions over a period of two school terms. The first phase of data collection consisted of gathering baseline data to ascertain students' previous digital media use and video making skills, and the nature of their social communication with peers. The second data gathering phase took place throughout the implementation and duration of the blended digital media lessons and sought to identify students' extent of media use and development of multimodal and social literacy skills.

### *Lesson Observations*

The researcher video recorded each lesson that involved students creating their own blended digital media. Upon watching the recorded sessions the researcher conducted open-ended observations and compiled notes about the extent of students' use of digital media to independently create a personalised blended digital media.

### *Behaviour Observations*

Prior to the students making their own blended digital media the researcher conducted observations of student behaviour as they spoke about their interests among peers in a news sharing social setting called "Social Club". These observations were audio recorded and supported by field notes. The researcher also conducted behaviour observations of students as they shared their blended digital media with their peers, spoke about what they had created, and responded to the blended digital media

of other students. Data gathered from these observations were compared to ascertain social implications of making blended digital media about personal interests.

### *Semi-structured Interviews*

One-on-one semi-structured student interviews were conducted by the researcher prior to the study to ascertain students' initial skills and experiences with regards to creating their own blended digital media and then again at the conclusion of the study. Data from these interviews were compared to identify changes in students' skills and understandings over time as a result of making their own blended digital media and to identify students' multimodal literacy skills and understandings of the affordances of different media forms and modes.

### *Student Work Samples*

Student work samples were collected and photographed during blended digital media lessons to triangulate with interview and observation data. Work samples included students' storyboards, photographs, videos, audio recordings and completed digital files (in the form blended digital media project files).

## Data Analysis and Trustworthiness

Thematic Analysis was conducted across data collection to identify emerging similarities, differences and themes among the data (Braun & Clarke, 2006). The researcher read within and among all data numerous times from beginning to end so as to become familiar with certain themes and determine categorisation of data (Stake, 1995). Such processes involved open and axial coding in which the researcher progressed from the identification of specific codes from within each data set to the relation of categories among extensive data (Creswell, 2007). Transcripts of students' initial and final interviews were coded in relation to themes concerning their understanding of modal affordances. Coded initial and final interviews then underwent comparative analysis. Video recorded lessons were transcribed and the observation notes that the researcher compiled upon viewing the recordings were coded in relation to themes concerning the multimodal skills that students could use in each lesson. Specifically, observation notes were categorised according to descriptions of the skills that students were able to use. Transcribed student and researcher dialogue from lessons was infused with descriptive observation notes to capture specific scenes from each lesson and enable a detailed narrative account of findings pertaining to each case study. Work samples were also analysed in relation to what they demonstrated about students' multimodal learning and participation in the making of a blended digital media. Work samples were then triangulated with data collected from interviews and observations.

## Results

Due to the extensive qualitative data gathered and the limitation of space, this paper makes a general reference to findings pertaining to the seven case studies involved in the study but provides a focussed account of the experiences of two students: Riley and Charlie. Findings relating to the first research question are discussed as follows.

### Extent of Digital Media Use

Findings revealed that students were each able to use an iPad to capture images, videos and screencasts that represented their interests. Using the iPad application "Explain Everything" students were then able to purposefully blend the media forms and record a narration to explain their interests. Students engaged with a variety of skills across five phases of construction in making their blended media including planning; media gathering; media importing and editing; narrating; and sharing.

### *Phase 1: Planning*

After having participated in an introductory lesson that was delivered by the researcher and the students' classroom teacher, and involved students co-constructing a blended digital media movie as a class, the students began planning for the making of their own blended digital media. The planning phase involved students discussing and documenting what interests they wanted to capture using the iPad, and what media forms they would use to capture data (e.g. image, video, animation, text, screencast etc.). Findings revealed that many students found it difficult to document a plan for what interests they would represent. Further, those that did document a plan did not identify what media forms they would use to represent interests prior to capturing data. For example, Charlie was able to tell the class that he wanted to take photographs of his dog but he chose not to document these ideas. Also, Charlie was unable to verbally describe or document other interests that he could represent with blended digital media. Findings suggest that Charlie, made decisions about what to capture when he took the iPad home and had the opportunity to use the camera function, thus indicating that the media gathering phase constituted more of a planning framework for him.

Unlike Charlie, Riley made a list of interests that he wanted to address in his blended digital media. Riley explained: "I wrote down a list of things I liked before I took photos and videos and I did everything on my list". Results indicate that this list guided Riley's media gathering. Nevertheless, this list did not include mention of what interests to represent using images or videos. As was the case with Charlie and all of the other case studies involved in the study, Riley did not plan what media forms to use to represent his interests, but rather made decisions as he captured media using the iPad.

### *Phase 2: Media Gathering*

After planning, students entered the media gathering phase. Students were given the iPad to take home over the weekend to capture images and videos for inclusion in their blended digital media. Results reveal that each student was able to use the iPad camera application to capture images and videos of different interests. Rather than focus on one or two interests, as was observed during news sessions prior to the study, the students were able to gather media to demonstrate a range of interests. Charlie captured media to represent 7 interests and Riley represented 8 interests. Specifically, Charlie took photographs of his dog, a trading card, books and movies. He also captured videos of himself playing card games and of his brother dancing. Riley took photographs of brownies, books, digital entertainment, food, trains, and Lego figurines. Riley also chose to capture a video that demonstrated him riding his scooter, and a video of him making pancakes.

Students' justification of their use of different media to represent specific interests revealed that they were capable of making purposeful decisions with regards to the use of modes and that they had an understanding of particular affordances of photos and videos communicating information about their interests. For example, Charlie was able to reason that "pictures are for when things are standing still so when you explain something moving they wouldn't help". Further, when justifying his use of video to represent his interest in playing card games, Chris reasoned: "I figured that pictures would not be enough so I decided to add two videos at the same time... of me playing cards with my carer". Chris also justified his use of video to represent his interest in his brother by highlighting the affordances of video: "Well my brother is really funny so I thought I would show a few clips of him dancing to a song, I figured video was best to show him moving not standing still".

When interviewed after having made his blended digital media, like Charlie, Riley was similarly able to articulate differences between image and video as means of representation and communication, and could justify his use of such media. In explaining why he chose to take photographs of books instead of videos, Riley said "you can't really make videos of books because they don't move for the camera, they are still". Such a comment reveals that Riley had an understanding of the affordances of images capturing still life and videos capturing movement. Further, in justifying his use of photos for representing his interest in cooking brownies, Riley showed awareness of media affordances in his reasoning that unlike videos, using images to depict each stage of the cooking method allows the audience to "see each step at once".

### Phase 3: Media Importing and Editing

Upon returning to school with their iPads the students were allocated time in class to work independently on importing, organising and editing their digital media in the Explain Everything iPad application. After having gathered various media forms, students edited data in the form of deleting images/videos that did not best represent their interests. Once students were content with their selection of digital media, they were able to import and organise their images and videos into slides, and add text. Findings revealed that students were able to categorise their interests into themes and create single slides consisting of various images and videos to represent such themes. For example, in one slide Riley was able to identify that an interest of his was “train -related”. This slide included 4 images as shown by Figure 1.



Figure 1. Snapshot of Riley’s Train-related Images

As can be seen in Figure 1, the first image on this particular slide is of a train from a museum, the second image shows a train from a heritage railway, the third image displays the logo of Hobbyco where model trains can be purchased, and the fourth image shows a train set from a Hobbyco store. Riley reasoned that he blended 4 different photographs in the same frame so as to “keep the train related stuff together”, thus demonstrating an ability to thematically categorise his interests and blend various media forms to represent specific interests within categories. Riley further demonstrated this ability in his justification of blending other forms of media to represent themes. Riley reasoned that he combined 3 photographs (one of an iPad, one of a YouTube channel, and one of a DVD) together because “these are all forms of digital entertainment”. Further, Riley explained that he blended 5 photographs of books because “I wanted to put it all in one photo to show all of the books I liked in one section”. Charlie similarly was able to justify his organisation and combination of media content based on themes. Charlie explained that “I put these two photos together because I wanted to show both my favourite movie and book together” and “I decided to add six different pictures of movies in the one screen to show the movies I like”.

As is the case with each of the students, and can also be seen in Figure 1, Riley utilised typed and handwritten text to label and support his images of train related interests. Charlie similarly used text in his blended digital media. This was made possible through use of text/drawing tools from within the Explain Everything application. Students’ justification of the use of text as a mode for communicating interests demonstrated their understanding of the affordances of specific modes and

the role of text. For example, in identifying the role of text, Riley explained that he used typed text for “titles and labels of things” because “typed is more official”. Riley further expressed that he used handwritten text because “it is more informal” and “I wanted it to look like graffiti”. Analysis of the different types of text used in Riley’s blended digital media supports Riley’s rationale in that it is evident that typed text was used to label specific images whereas handwritten text was used to add informal commentary and humorous captions. Charlie was also able to articulate that he used “words to explain the pictures and videos”. Further, Charlie seemed aware of how words operated as one of many modes in communicating meaning about specific interests. Charlie highlighted his use of a range of modes, including text, to communicate meaning when without being prompted he identified: “I used pictures, words, arrows and videos as well as narration to explain my interests”.

Another mode used by both Riley and Chris, among many other of the case studies involved in the study, to communicate meaning was the screencast tool of moveable arrows (as can be seen in Figure 1). Riley explained that the arrow “means that this is the place I like to get trains at. It is pointing to Hobbyco”. Further, Charlie was able to justify his use of arrows by explaining: “the arrows are pointing to each of the films to show all 5 videos”.

#### *Phase 4: Narrating*

After having imported, organised, edited and labelled their digital media using Explain Everything, students then audio recorded a narration to explain each of their media representations. Before recording their narration, students planned what they were going to record using a storyboard template that acted as a guide for what to say. The storyboards of some students included dot points for elaboration, whereas other students typed a narration script to be read out verbatim. In each instance students referred to their media when formulating a narration plan. Charlie and Riley, were among the students who rather than typing a script, decided to write dot points about ideas that they could discuss in relation to their digital media. When it came to recording these ideas, Charlie and Riley selected the recording function in the Explain Everything application and confidently spoke while glancing at the media and dot points for guidance and prompts. Table 1 provides a transcript of Riley’s narration in relation to each segment and category of his blended digital media, and his use of media to represent specific interests.

Results reflect that the use of image and video in students’ blended digital media may have scaffolded students’ language use when recording a narration. Student narration transcripts were compared with field notes from observations of students talking about their interests with peers during class news time. Comparison of students’ ability to communicate their interests in both contexts revealed that the narration of students’ blended digital media was much clearer and addressed a wider array of interests than their conversations with peers which were often jumbled and consisted of repetitive speech about one or two interests. For example, it can be seen that the use of images and video kept both Charlie and Riley on track with regards to what they were to narrate, in many ways acting as a prompt and guide for reminding them about the content they needed to explain, and simultaneously providing a visual context to verbally expand upon. The most striking example of how images supported Riley’s use of language was in the “cooking brownies” section of his blended digital media. In this section Riley used 9 images that depicted different stages in the method of cooking brownies. When recording his narration, Riley was able to look at each image and explain the process that he engaged with to make brownies. As can be seen in Table 1, such an explanation was comprehensive. In this particular instance, the images scaffolded Riley’s procedural recount of cooking. Such clear communication using verbal language is in contrast to what was observed from Riley interacting with peers and speaking about his interests during news time. Unlike Riley’s blended digital media that addressed a range of interests in a clear and coherent manner, Riley’s communication of interest during class news consisted of repetitive references to the workings of trains. Similarly, it was evident that Charlie was able to use the digital media as a reference and means of prompting a more coherent explanation of interests than he could communicate verbally through news. Preliminary news observations saw Charlie talk in detail about specific foods he likes whereas; Charlie’s blended media narration addressed a range of interests with a more appropriate level of descriptive detail.

**Table 1**  
**Riley's Narration**

Slides/ Interests	Media	Narration Transcript
Introduction	3 images	My interests, by Riley.
Cooking brownies	9 images	I like to cook brownies. Delicious. Num Num. You have to chop the butter and later melt it. Then break eggs and lightly beat eggs. Get all of the ingredients and mix the brown sugar into the melted butter (I had a bit of an incident with that). Then stir the flour and cocoa powder into the mixture and stir it up. Then I got brownies out of the oven, (had a shower before they were done), and then skewered the brownies, and put them on the rack and ate a brownie
Books and comics	5 images	Books I like are Andy Griffiths books, Dav Pilkey books, books on super heroes, Asterix books, and Tin Tin books. Those books really crack me up. They are so funny.
Digital entertainment	3 images	Things I like to do for digital entertainment is to play on my iPad and watch YouTube videos, and watch Dad's Army, or other classic videos, or other classic shows I mean.
Stuff I like to eat	2 images	Things I like to eat are pancakes and Red Rooster. They are so delicious and yummy.
Train related interests	4 images	Train related things I like to do are go to museums, heritage railways, and hobby stores to see the trains.
Riding scooter	1 video (without audio)	Hello. This is me riding the scooter up and down the driveway. I like to do this. It is good exercise and good fun.
Cooking pancakes	1 video (with narrated audio)	Now I am just flipping the pancakes out. Well done on each side and crispy (well probably not crispy, but delicious all the same). Just the way I like it. Nice and brown on one side and bits of crispy bits on the other side. Now those are freshly made pancakes.
Lego	1 image	Lego is the best toy in the world and I hate Lego imposters. They can be practically anything in the world and more. And did you know that Lego was originally wooden toys?
Conclusion	-	Yeah goodbye.

After recording their narration, students saved/exported their media project from the Explain Everything application to the camera roll of their iPad. Students then uploaded their saved video file to their school computers and saved a copy to their USB.

### *Phase 5: Sharing*

After having made and saved a copy of their blended digital media files to their own portable devices, students were given the opportunity to share what they created with their peers. The teacher arranged for a lesson that involved students sharing and discussing their blended digital media projects with each other and with other teachers. Results revealed that students expressed an eagerness to share their blended digital media with their peers and felt a sense of satisfaction by being given the platform for sharing what they had created. When asked about how he felt about sharing what he had created with others, Riley stated that "...it was good to show my video to the class so that they could see my interests instead of me just talking about them and it made them laugh, especially when I said in it that joke about Lego imposters". Riley also expressed pride in his work: "I felt proud. You have to take pride in your work". Similarly, Charlie expressed satisfaction with sharing his blended digital media with the class: "I was a little bit shy of my voice but it was good to show the pictures and see other peoples".

Results also indicate that students were engaged by the media of others and that by viewing each other's blended digital media, students learned more about their peers, and discovered common interests. Riley expressed that he "enjoyed watching everyone else's movies" and that he "learnt about others, like how Mario likes clothes and Charlie likes a video game called Kirby". Further, Charlie explained: "Well I learned that Jimmy, Jack and Damien all have a common interest. They all like cats. And well Riley liked Lego, and he liked books as well, as did I".

Observations of the sharing session revealed that students were more engaged watching the



blended digital media of their peers than listening to their verbal explanation of interests during news. Further, unlike news sessions where students lacked an interest in the interests of others and did not ask questions, the blended digital media sharing session saw students actively contribute feedback about each other's blended digital media, ask questions, and engage in social interaction.

## Discussion and Implications

Social literacy and communication for students with Autism Spectrum Disorder (ASD) is a challenging area in spite of many years of research and interventions. Previous studies have shown that social skill and communication development strategies designed by teachers and professionals such as Social Stories and video-modeling have improved social skills for students with ASD (Chan & O'Reilly, 2008; Charlop et al., 2010; Crozier & Tincani, 2007; McConnell, 2002; Mechling & Swindle, 2012; Quimbach et al., 2009; Wang & Spillane, 2009). This study, however, provided insight into the effects of involving students in the creation of their own blended digital media about their personal interests to promote social and multimodal literacy development.

Findings revealed that each student could use a combination of images and videos, alongside text, screencast tools, and an audio recorded narration to create their own blended digital media about their interests using the iPad application Explain Everything. Across phases of blended digital media construction including planning; media gathering; media importing and editing; narrating; and sharing, students engaged with a variety of skills that supported social and multimodal literacy development.

Results demonstrated that students experienced challenges with regards to formally documenting a plan to guide media gathering. Ryan was the only student who chose to compile a list of interests to represent. Charlie and the other case studies expressed that they did not wish to write a plan but rather made decisions about what to capture on the go when they were equipped with iPads. The difficulties that students had with regards to planning prior to media gathering aligns with executive function theory that suggests that individuals with ASD experience significant impairment of executive functions such as organising, planning, sustaining attention, initiating tasks, flexibility of thought and action, utilising self-control, and inhibiting inappropriate responses (Hill, 2004; McCloskey et al., 2009). Further, the fact that students were better able to plan through capturing and editing media is consistent with literature that suggests that visual supports are often the learning preference for students with developing writing skills (Ayres & Langone, 2005; Bellini & Akullian, 2007; Bernad-Ripoll, 2007; Thiemann & Goldstein, 2001).

Despite experiencing difficulties with regards to planning for media gathering, students were able to demonstrate the ability to plan by storyboarding ideas or a script for their blended digital media narration. Further, in contrast to executive function theory's assumption that students with ASD experience significant impairments with regards to planning and organising information (Hill, 2004; McCloskey et al., 2009), observations of students importing, editing and narrating their blended digital media reflected students' capacity to purposefully select and arrange specific media forms, thus demonstrating initiation of tasks, flexibility of thought, and the ability to reason. Further, the arrangement of Charlie and Riley's digital media reflected their ability to comprehensively organise information into thematic categories. The use of such executive functions can also be attributed to the facility with which Charlie and Riley could articulate the affordances of image and video, the role of typed and written text and screencast arrows, and the justification of using specific modes of communication to represent their interests.

Research findings revealed that the narration of students' blended digital media demonstrated a clearer and more comprehensive explanation of a variety of personal interests than students had previously been observed to communicate verbally during news time with their peers. This finding is consistent with literature that suggests that students experience difficulties with regards to social and communication skills and that they find it difficult to interact with peers (American Psychiatric Association, 2000). Further, research suggests that students with ASD have a tendency to focus on specific interests and lack the awareness of social cues that indicate the level of an audience's interest in what is being communicated and the appropriateness and relevance of what is being said (Bergeson et al., 2008; Hill, 2004; McCloskey et al., 2009).

Research results revealed that students experienced a level of satisfaction with regards to sharing their blended digital media with their peers and that the process of making and sharing their digital media was engaging. Such a finding is consistent with research that suggests that students' engagement is enhanced when tasks draw on visual supports or integrate technology (Bellini & Akullian, 2007; Bernad-Ripoll, 2007; Litras et al., 2010). Observations of students sharing their blended digital media further suggest that students gained a greater awareness and appreciation of the interests of others and that such a task promoted interaction opportunities.

While there is an emerging body of research that favourably reports on the implementation of computer-based social and communication skills interventions that integrate Social Story and video modeling techniques (Mancil et al., 2009; Mandasari et al., 2011; Ploog et al., 2013; Sansosti & Powell-Smith, 2008), these strategies are expert-generated and there is a lack of research regarding students' acquisition of social or multimodal literacy skills through engagement with blended digital media creation. Consistent with recent investigations into the potential of self-regulated learning in Special Education (Kim & Park, 2012; Lane et al., 2010; Mazzotti et al., 2010), especially strategies that involve the use of technology, this exploratory study suggests that there may be considerable value in students with autism participating in the planning and construction of their own blended digital media. Limitations of the study, however, suggest that it would be worthwhile to repeat the study with a larger number of students with ASD, and compare the effects of student created digital media with teacher/expert generated social and multimodal literacy development strategies using a quasi-experimental design.

## References

- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4<sup>th</sup> ed., text rev.). Washington, DC: Author.
- Ayres, K.M. & Langone, J. (2005). Intervention and instruction with video for students with autism: A review of the literature. *Education and Training in Developmental Disabilities*, 40(2), 183–196.
- Bellini, S. & Akullian, J. (2007). A meta-analysis of video modeling and video self modeling interventions for children and adolescents with autism spectrum disorders. *Exceptional Children*, 73(3), 264–287.
- Bergeson, T., Davidson, C., Harmon, B., Gill, D. H., & Colwell, ML. (2008). *The Educational Aspects of Autism Spectrum Disorders*. Olympia, WA: Special Education, Office of Superintendent of Public Instruction. Retrieved November 8, 2013, from <http://www.k12.wa.us/SpecialEd/pubdocs/AutismManual.pdf>
- Bernad-Ripoll, S. (2007). Using a self-as-model video combined with Social Stories to help a child with Asperger Syndrome understand emotions. *Focus on Autism and Other Developmental Disabilities*, 22(2), 100–106.
- Board of Studies NSW. (2012). *English K-10 syllabus*. Sydney: Board of Studies NSW.
- Chan, J., & O'Reilly, M. F. (2008). A Social Stories intervention package for students with autism in inclusive classroom settings. *Journal of Applied Behavior Analysis*, 41(3), 405-409.
- Charlop, M. H., Dennis, B., Carpenter, M. H. & Greenberg, A. L. (2010). Teaching Socially Expressive Behaviors to Children with Autism through Video Modeling. *Education and Treatment of Children*, 33(3), 371-393.
- Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five traditions* (2nd ed.). Thousand Oaks, CA: SAGE.
- Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). Thousand Oaks, CA: SAGE.
- Crozier, S., & Tincani, M. (2007). Effects of social stories on prosocial behavior of preschool children with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 37(9), 1803-1814.
- Hill, E. (2004). Evaluating the theory of executive dysfunction in autism. *Developmental Review*, 24, 189-233.
- Hoban, G. F. (2005). From claymation to slowmation: A teaching procedure to develop students'

- science understandings. *Teaching Science: Journal of the Australian Science Teachers Association*, 51(2), 26-30.
- Hoban, G., W. Nielsen. & Shepherd, A. (2013). Explaining and Communicating Science Using Student-created Blended Media, *Teaching Science*, 59(1), 32-35.
- Kim, N. H., & Park, J. (2012). The effects of the family-involved SDLMI on academic engagement and goal attainment of middle school students with disabilities who exhibit problem behaviour. *International Journal of Special Education*, 27(1), 117-127.
- Kluth, P. (2010). *"You're Going to Love This Kid!" Teaching Students with Autism in the Inclusive Classroom* (Rev. ed.). Baltimore: Brookes.
- Lane, K. L., Graham, S., Harris, K. R., Little, M. A., Sandmel, K., & Brindle, M. (2010). Story writing: The effects of self-regulated strategy development for second-grade students with writing and behavioral difficulties. *Journal of Special Education*, 44(2), 107-128.
- Litras, S., Moore, D.W., Anderson, A. (2010). Using video self-modelled social stories to teach social skills to a young child with autism. *Autism Research and Treatment*, 2010, 1-9.
- Mancil, G.R., Haydon, T. & Whitby, P. (2009). Differentiated effects of paper and computer-assisted social stories (TM) on inappropriate behaviour in children with autism. *Focus on Autism and Other Developmental Disabilities*, 20(10), 1–11.
- Mandasari, V., Lu, M.V. & Theng, L.B. (2011). '2D animated social story for assisting social skills learning of children with autism spectrum disorder'. In L. Theng (ed.), *Assistive and Augmentive Communication for the Disabled: Intelligent technologies for communication, learning and teaching* (pp. 1–24). New York: Information Science Reference.
- Mazzotti, V. L., Wood, C. L., Test, D. W., & Fowler, C. H. (2012). Effects of computer-assisted instruction on students' knowledge of the self-determined learning model of instruction and disruptive behavior. *The Journal of Special Education*, 45(4), 216-226.
- McCloskey, G, Perkins, L.A., Van Divner, B.R. (2009). *Assessment and intervention for executive function difficulties*. New York: Routledge Press.
- McConnell, S. R. (2002). Interventions to facilitate interaction for young children with autism: Review of available research and recommendations for educational intervention and future research. *Journal of Autism and Developmental Disorders*, 32(5), 351-372.
- Mechling, L. C., & Swindle, C. O. (2012). Fine and gross motor task performance when using computer-based video models by students with autism and moderate intellectual disability. *Journal of Special Education*. Prepublished January, 19, 2012, DOI: 10.1177/0022466911433859.
- Mertens, D. M. (2010). *Research and evaluation in education and psychology: integrating diversity with quantitative, qualitative, and mixed methods* (3rd ed.). Thousand Oaks, CA: SAGE.
- Mertler, C. A., & Charles, C. M. (2005). *Introduction to educational research* (5th ed.). Boston: Allyn & Bacon.
- Ploog, B. O., Scharf, A., Nelson, D. & Brooks, P. J. (2013). Use of Computer-Assisted Technologies (CAT) to Enhance Social, Communicative, and Language Development in Children with Autism Spectrum Disorders. *Journal of Autism and Developmental Disorders*, 43(2), 301-322.
- Quimbach, L. M., Lincoln, A. J., Feinberg-Gizzo, M. J., Ingersoll, B. R., & Andrews, S. M. (2009). Social Stories™: Mechanisms of effectiveness in increasing game play skills in children diagnosed with autism spectrum disorders using a pretest posttest repeated measures randomized control group design. *Journal of Autism and Developmental Disorders*, 39(2), 299-321.
- Ricketts, J., Jones, C. R. G., Happe, F. & Charman, T. (2013). Reading Comprehension in Autism Spectrum Disorders: The Role of Oral Language and Social Functioning. *Journal of Autism and Developmental Disorders*, 43(4), 807-816.
- Sansosti, F. J., & Powell-Smith, K. A. (2008). Communication skills of children with high-functioning autism spectrum disorders. *Journal of Positive Behavior Interventions*, 10(3), 162-178.
- Shepherd, A. Hoban, G., & Dixon, R. (2014). Using Slowmation to Develop the Social Skills of Primary School Students with Mild Intellectual Disabilities: Four Case Studies. *Australasian Journal of Special Education*, 38(2).
- Wang, P., & Spillane, A. (2009). Evidence-based social skills interventions for children with autism: A meta-analysis. *Education and Training in Developmental Disabilities*, 44(3), 318-342.