

Transition to Digital: Documentation Practices in Early Childhood Development

Sarah D'Angelo

Committee

Primary Advisors: Jim Hollan and Anne Marie Piper

Secondary Advisor: Ed Hutchins

Abstract

Documentation of development in early childhood education is a critical aspect of mapping a child's developmental trajectory and guiding instruction in the classroom. Importantly, at our field site, this was a primarily paper-based process and has recently transitioned to an online record keeping system. Through interviews and field observations, we analyze the process of documentation before and after the transition from paper to digital. The process of completing a developmental ratings portfolio for each child is a lengthy, involving the collection of evidence in the form of digital photos, observations, and work samples. Evidence must then be stored, recorded, and analyzed to support a given developmental milestone. We will consider the effects of medium (paper or digital) on the collection, quality, and interpretation of developmental portfolios.

Introduction

With the expanding presence of online record keeping systems specifically in the fields of education and medical records, much research focuses on the transition and integration of digital media into primarily paper-based practices. Additionally, much research has shown the affordances of paper and why it has persisted in light of the new technologies available. When presented with the option to "go digital" organizations are typically in favor of the switch, believing that reducing paper will reduce workload. However, there are often unexpected consequences resulting from this change.

Documentation is one example of a process that is heavily paper dependent, specifically within the context of early childhood education. This research takes place at the early childhood education center affiliated with our university. We focus on the process of documenting development, specifically the completion of the California Desired Results Developmental Profile (DRDP) and the recently introduced online version DRDPtech. The DRDP is a paper based portfolio containing ratings for developmental measures and corresponding evidence for each individual child. DRDPtech is an analogous online system for inputting ratings for every child.

Through the transition to digital we have analyzed two years of classroom observations at the early childhood education center and detailed interview notes to understand previous paper based practices and current digital practices. The theme of this work was motivated by Sellen and Harper's work in which they explain: "It is only by looking carefully at people's interactions with paper artifacts, and with the digital technologies they have to hand, that we can hope to predict the circumstances under which they might be willing to give up paper" (Sellen and Harper 2001). Their work emphasizes the importance of supporting paper and digital media work in synchrony rather than striving to remove paper altogether.

Our analysis highlights the effects of a transition from paper to digital and the importance of paper and digital media in both contexts. Through our understanding of documentation practices, observations of development are recorded on paper or through digital photos. These photos are a crucial form of evidence and as an objective account and a memory aid to teachers. Surprisingly, DRDPtech does not support uploading or linking of digital photos or scanned documents, this has introduced new challenges to the process.

Our analysis of documentation practices includes both before and after the introduction of the online system. We will discuss the opportunities and challenges for both contexts (paper and digital), this analysis contributes to literature on transitioning from paper to digital record keeping practices and the prevalent divide between paper and digital medium. We will also highlight the affordances of hybrid medium as they apply to our context of early childhood education. Specifically, preliminary results of the use of a companion iPad application to support evidence collection will be reported.

The process of documenting is well studied, primarily understanding how information is recorded, shared, and transformed through individuals and organizations detail over time. Recording events specifically written documents create a link to the past that can be accessed in the future as a form of evidence to support claims (Goody 1987).

The act of documenting and recording can also serve as a training method. Establishing standard procedure can highlight important aspects of routine activities, Suchman identifies that standard processes help workers understand what content they should record and the construction of organized work (Schuman 1983). With respect to creating recording keeping templates, the structure of the document critically shapes how people decide what information to provide (Heath and Luff 1996). The organization of templates help actors facilitate frequently encountered tasks by providing constraints that ease cognitive load (Hutchins 1995). These aspects are illustrated in our work, teachers use the results of the DRDP to guide lesson planning and establish goals. Additionally, teachers have created a variety of evidence templates to support photo and written forms of evidence.

The context of this work is early childhood education and the actors primarily include the teachers and administrators. We will define documentation in this context as "Samples of a child's work at several different stages of completion: photographs showing work in progress; comments written by the teacher or other adults working with the children; transcriptions of children's discussions, comments, and explanations of intentions about the activity; and comments made by parents" (Katz and Chard 1996).

An essential aspect of the early education center described in this work is the Reggio Emilia Approach (Cadwell 2002; Hewett 2001), which is a core philosophy of this center. This pedagogy emphasizes observations rather than standardized testing as a method for tracking development. An addition to this

approach develops documenting observed child activity as routine practice in the classroom (Katz and Chard 1996). There are many benefits of tracking progress through observations rather than standardized testing. Specifically, this approach may lead to a more authentic assessment of learning (Wiggins 1990; Sietz 2008). This work aims to provide insights on the process of documenting development in the classroom and how different medium affect this process.

1. Methods

1.1 Sample

This research takes place at the Early Childhood Education Center affiliated with the University of California, San Diego and IRB approval was obtained prior to the start of the study. The center enrolls 210 children ages three months to preschool (approximately 5 years old). The children are placed into a classroom by age group. The center has 10 classrooms and 38 teachers. The teacher to child ratio is 1:4 in infant toddler classrooms (under 3 years old) and 1:8 in preschool classrooms (over 3 years old). Single initial and age group will be used to identify quotes from teachers to protect their identity.

1.2 Field Observations

The research team has been conducting regular classroom observations at the site for 2 years. The team has been present in every classroom at the center, but a majority of the observations were conducted in one preschool aged (3-5 years of age) classroom and one infant toddler aged (0-3 years of age) classroom. Focusing on a representative classroom from each age group allowed the research team to observe regular classroom activities and make comparisons across age groups. As participant observers, we worked with the children experienced many of the daily activities such as crafts, computer time, and outside play. After much observation we began to focus our attention on the practice of how teachers document development in the classroom and how the transition to an online system has affected this process. All classrooms are required to complete the DRDP and participated in the transition to DRDPtech.

1.3 Interviews

We conducted 24 interviews with thirteen teachers and two supervisors before and after the transition to DRDPtech at the early childhood education center. Before the introduction of DRDPtech nine teachers were interviewed in a semi-structured fashion focusing on the process of completing the DRDP. Two of the teachers had a follow up interviewing focusing specifically on the use of digital photos. After the introduction of DRDPtech five of the previous nine teachers and four new teachers were interviewed in the same semi structured fashion but with a new focus on the transition to DRDPtech and the process of documenting development. Teachers were interviewed individually with a paper portfolio or at a computer with DRDPtech and asked to describe and demonstrate the process of recording evidence for a child. One or Two researchers were present and took notes during the interviews, which lasted 20 – 30 minutes. All interviews were either audio or video recorded and later transcribed.

1.4 Analysis

Our analysis takes into account our extensive period of observation at the field site and interactions with teachers and staff both interviews and informal discussions. We employ theories of distributed cognition (Hutchins 1995; Hollan, Hutchins, and Kirsh 2000) to understand the flow of information within the larger system of the classroom and also the organization. In developing themes from the data we carefully reviewed all interviews, field notes, and photographs. The goal of this work is to understand how teachers document development, particularly with the respect to the transition from paper to digital

media. In this we hope to gain more understanding about the influence of digital technology in a previously paper dominated activity and identify opportunities and considerations for design.

2. Results

The introduction of digital media to a primarily paper based system provides a unique opportunity to examine the transition. The practice of documenting development in early childhood education relies heavily on the use of paper, as we will illustrate. Now that the transition to a new online record keeping system is complete, this study will describe the details of the old paper-based system and the changes posed by the new digital system.

2.1 Desired Results Developmental Profile (DRDP)

Every teacher at the early childhood education center is required to complete the DRDP and use it as a tool for mapping developmental process. A teacher is assigned a group of four or eight students depending on the age group; children enter these groups as soon as they start at the center. In addition to many other tasks, teachers are constantly observing development and using their knowledge to complete the DRDP, which aids them in directing parent conferences, and customizing lesson plans based on student needs.

There is a specific time frame for the completion of the DRDP. Initially the DRDP is completed 60 days after the child has joined the class, then again every six months after. The DRDP is state-mandated for children who receive subsidized tuition, however at this center teachers must complete the DRDP for every student in their group. It is the primary tool for tracking and documenting aspects of early childhood development this center. The DRDP contains rating scales along 35 dimensions for infants and toddlers (0-3 years old) and 43 dimensions for preschool children (3-5 years old).

Teachers are the primary creators of the portfolios, however there are several other audiences for the DRDP as well. At the highest level, the state can audit the center and examine DRDPs to ensure appropriate developmental progress is being maintained. School administrators also review portfolios for every child at the center and analyze results of the DRDP in aggregate to set center wide curriculum goals. When a child enters a new age group their portfolio will be passed on to the next teacher and will continue to accumulate assessments over their time at the center. Finally, parents view aspects of their child's DRDP at parent-teacher conferences. Parents are typically shown a high-level summary about development that is based on data in the portfolio.

Completing a DRDP for an individual child is an extensive and continuous process (illustrated in Figure 1 below). Teachers first observe a significant child activity in the classroom, record the details of the event, store this information in various formats, review and organize the evidence, analyze the evidence against examples of standard developmental measures, and finally develop a link between evidence and ratings of various measures. Central to the DRDP is the rating scale on various developmental measures. Infants and toddlers (birth to 36 months old) are rated on 35 measures using a five-point scale (responding with reflexes, expanding responses, acting with purpose, discovering ideas, or developing ideas). Preschool children (age 3-5) are rated on 43 measures using a four-point scale (exploring, developing, building, or integrating).

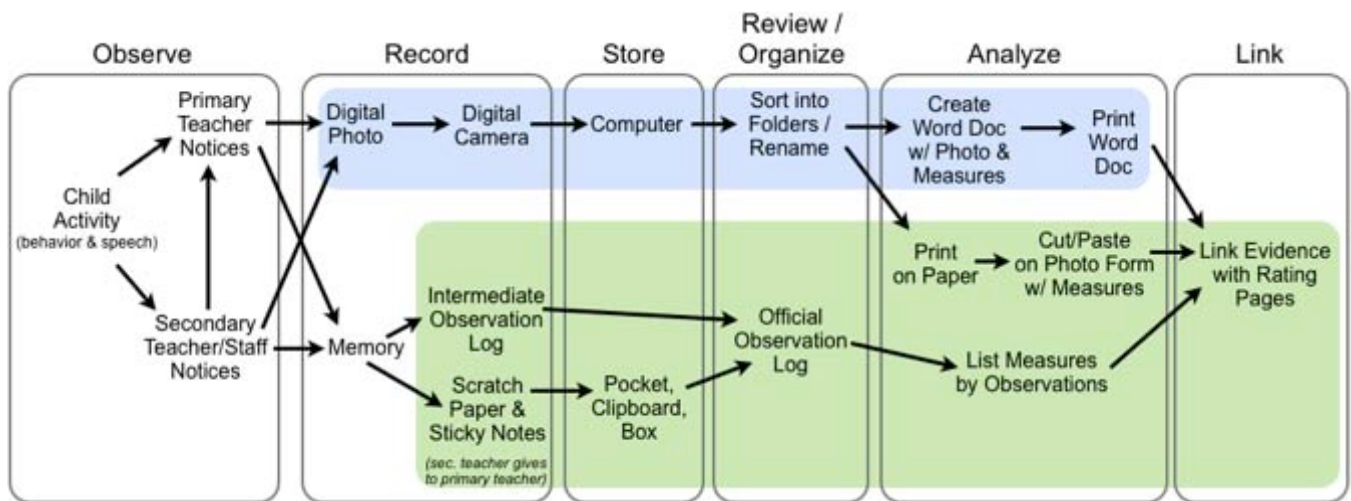


Figure 1: The process of documenting a child activity; the green highlights paper based aspects and the blue highlights digital aspects.

2.2 Evidence

A central aspect of completing the DRDP is gathering evidence of development. Many teachers use the word “proof” to describe the evidence they collect on childhood development. Much time and care is spent making and documenting observations of children. Obtaining the ability to identify proof is a skilled practice of observing (Goodwin 1994) that requires much training and experience. Teachers are observing children in the classroom on a daily basis and documenting their interactions with other children, teachers, and parents.

“It’s not something I like to say ‘okay I’m going to observe you in a week and have all these answers’ cause I want at least a month. It’s important for me to get that longevity into it.” –M, 2-3

2.2.1 Types of Evidence

There are three primary types of evidence: written observations (behaviors and quotes), work samples, and digital photos. Observations are written on various forms of paper and contain varying levels of details on a child’s activity such as a milestone accomplishment or a conversation. Teachers occasionally write down direct quotes from the children as an element of written observations. Work samples are included less frequently than other forms of evidence. They are most prevalent in portfolios for children age four and older. Of the three, the most common form of evidence is a digital photo. Each classroom has a digital camera that teachers use to document activities for both the DRDP and various community reports such as an activity board or newsletter. Teachers can accumulate up to hundreds of photos for a single child. From our interviews, many teachers report that photos are their preferred form of evidence. There are benefits of photo documentation that make, our analysis will focus primarily on the qualities of photo documentation that allows them garner “good” evidence.

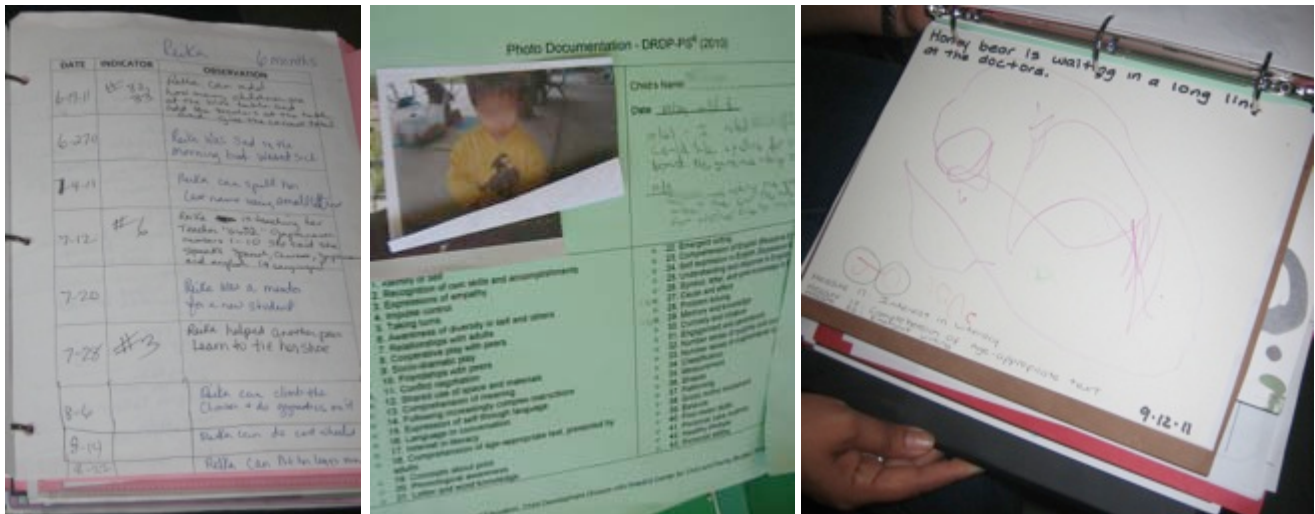


Figure 2: Examples of evidence; (from left to right: observation log, photo evidence form, work sample)

2.2.2 Qualities of Good Evidence

The primary goal in gathering evidence of development is to maintain *authenticity*. Teachers aim to capture students legitimately engaged in an activity rather than instructing a child to satisfy a developmental measure.

“I want it to be authentic. I never tell a child ‘oh here use the marker’ so I can get a DRDP note.” – A, 1-2

Developmental evidence should also be *objective*. Teachers define objectivity in this practice as not interpreting the child’s behavior. When quoting a child they write down exactly what they see or hear from a child without adding their interpretation.

Teachers are constantly collecting evidence to aid in their understanding of a child’s developmental level. These observations are directly integrated into lesson plans to support student needs. As a part of a continual portfolio evidence is recorded with the intention of being shared with for future audiences (including other teachers, administrators, and parents). Teachers want evidence that is *easy for other people to understand* given a shared background and training.

2.2.3 Importance of Photo Documentation

In addition to photos, teachers collect written observations and quotes from children and artwork samples as evidence of development. Compared to these other methods, certain qualities of photos enable them to play a particularly important role in this process. Given the limitations of paper medium video and audio recording has not been explored as a method for documenting.

Photos contribute to good evidence because they can capture rich detail of activity in terms of its context and artifacts that were involved. An image of the event serves as a memory aid for teachers when they analyze and assess development after the event as occurred. Photo documentation also supports teacher efficiency in several ways. The richness of photos allows teachers to apply a single image to several different developmental measures. Photos can include multiple children allowing a single image to serve

as evidence for multiple students. In the classroom, teachers have digital cameras on hand for quick access and do not need to rely on memory to write down an observation after the event.

“I’ll see it and instead of writing it down to where later I gotta get more context, I just go take a photo of it... I don’t have to leave the floor... I prefer to take a photo of it cause it’s a lot easier to just come back to it later.” – N 2-3

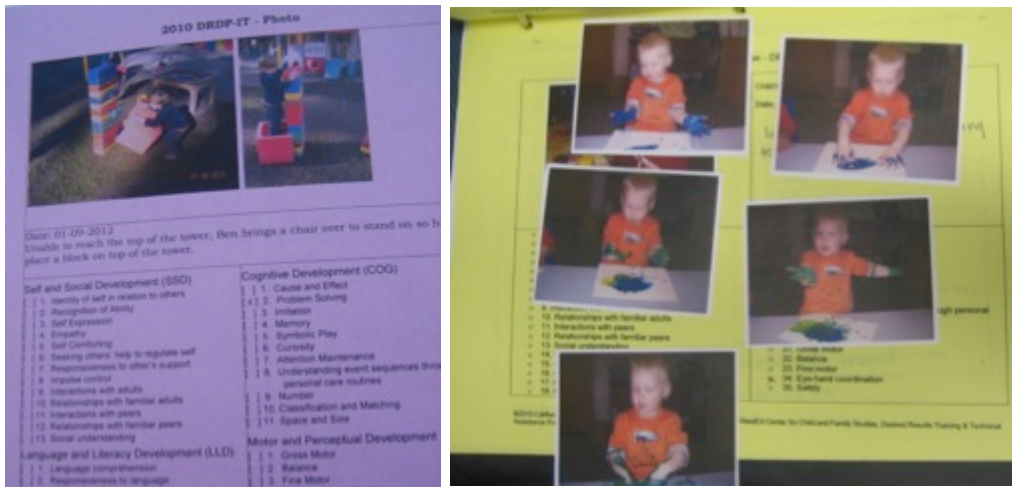


Figure 3: Examples of digital photos used to show problem solving (left) and sequence of events (right)

Teachers also take multiple photos of the same event from different angles and over the duration of the activity. Sequences of photos can show the progression of an activity rather than just the final product as well as the process a child goes through when solving a problem. This technique is used to show various perspectives of a behavior and aids in understanding tasks that involve many steps. Given the busy nature of a classroom, teachers often capture images in very dense perceptual fields and use different perspectives (e.g., close up of a child’s hand) to highlight a salient feature that makes their observation easily interpretable by others (Goodwin 1994). The timestamp feature of digital photos is valuable in creating legitimate evidence and allows teachers to identify when an observation occurred with respect to the child’s age.

“I do that on purpose because...for...accuracy... the observer comes in and checks my work knows that the photo was taken on that day...it’s just the extra step so you can trust my word.” – N 2-3

2.3 Analysis of Evidence

Over time, teachers collect more evidence than they can include in the portfolio. They must make decisions about which observations and photos to include as evidence. To aid in this process, teachers have developed format templates (one for observations and the other for photos). These forms serve as boundary objects (Star and Griesemar 1989) and provide a standard structure that is understood by the various audiences of the portfolio. *Observation Logs* include a space to write the observation and measure numbers that are to be satisfied by the observation. Teachers can fill in the measure numbers at various times during the process. *Photo Documentation Forms* are similar, they contain a space for the photograph and a list of all the measures with a space to check off the measure(s) illustrated in the photo. Most teachers use a printed photo documentation form that is part of the DRDP and cut up photos

and tape them to the documentation page. However, we also encountered two teachers, who create their own version of the template electronically with Microsoft Word.

“I like to do it this way because I have the pictures on the computer and I can just...take it from my folder of pictures and put it onto the Word document and then write my captions that go with it rather than cut and glue and or tape and all that...” –L, 4-5

2.4 Link and Synthesize Evidence

In completing the DRDP, teachers must provide evidence of their rating for every measure. Each measure has a separate page in the portfolio and teachers will cite the evidence contained in the portfolio that corresponds to the measure. The critical detail in linking is the type of evidence and the date recorded. Teachers can cite multiple pieces of evidence for a single measure, and also have multiple measures for a single piece of evidence creating a trail of interconnected pages.

At the higher level, teachers and school administrators calculate developmental progress for various groups (e.g. individuals, classes, age groups, and the school as a whole). They use these calculations to create center wide goals and plan curriculum. Manually aggregating ratings from these paper forms was a challenge for teachers and school administrators.

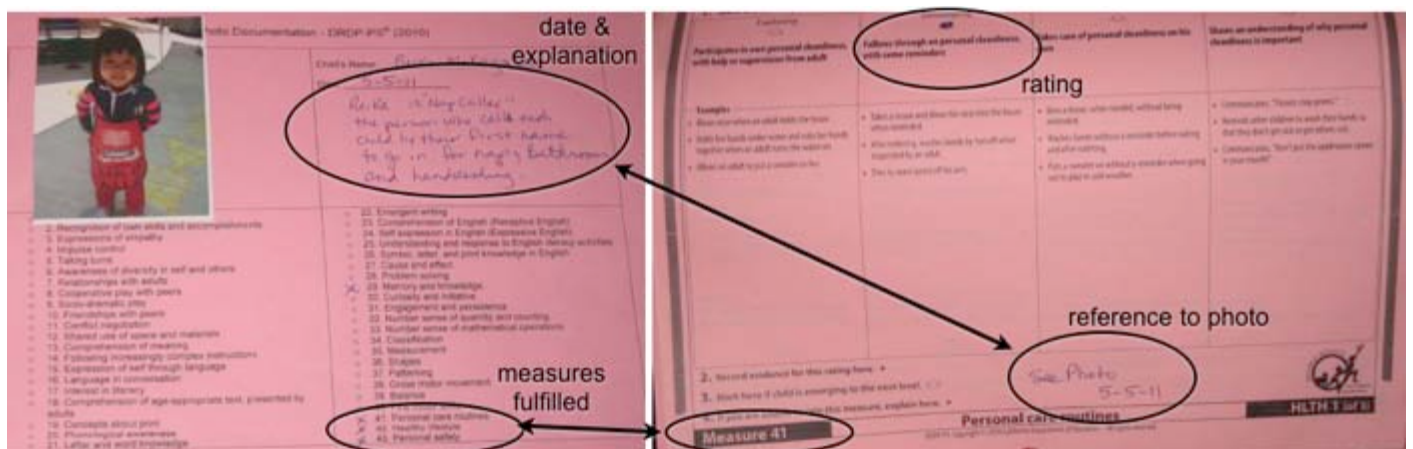


Figure 4: Linking a rating (right) with a photo evidence form (left)

2.5 Sharing Information

Since one teacher is held responsible for the creation of a portfolio it is primarily and independent process. However, there are three instances around communication and information sharing involving the DRDP.

Sharing Among Teachers commonly occurs within a classroom. Teachers will discuss the development of the children informally as well as during scheduled weekly meetings. While teachers primarily focus observations on their own children they will take note of other teacher’s children especially when involved in a joint activity. Additionally, teaching assistants occasionally provide teachers with observations.

“Occasionally our teacher assistants will be helpful enough to say ‘oh here, here’s what I caught from your children today’ and they’ll have time to do that for us... Recently we’ve had a teacher’s aid in our class that handed me a piece of paper and said ‘here’s some quotes I got from your kid’.” –M, 2-3

When a child transitions between two primary teachers during the assessment period or if the child's native language is different from the teacher's the primary teacher will seek out help more directly. Finally, teachers will also share photos and are careful not to delete photos from a shared camera without checking with the teachers in their classroom.

"I don't just print my kids' [photos]. I keep every single photo we have in the computer so that way if someone else wants one too, I can tell them 'oh yea go in my folder, you can print out some for your kids too'." –A, 1-2

Information Sharing with Parents occurs after an assessment period at parent teacher conferences. Parents are typically not shown the full portfolio rather they are given a summary. This is because teachers state that the profile may be intimidating and the rating scales can be overwhelming or misinterpreted by parents. Teachers make careful decisions about what information to present to parents and how to discuss their interpretations. After completing the assessments, teachers generate a summary report for each child using a template from the DRDP, which is shared at conferences and included in the portfolio. Teachers commonly use photos to illustrate examples of a child's behavior and can also give parents photos during the conference.

Accumulating and Sharing Information Over Time is inherent to the longevity of the profile. Portfolios are stored in a condition where information is ready to share with outside observers in the event of an audit. Since the portfolio is an evolving record of the child's development, teachers add to the portfolio with each assessment and as the child transitions to a new classroom. At the end of a child's time at the center, multiple teachers could have contributed to a single portfolio. This creates challenges with consistency in documentation.

"Because everyone kind of thinks that they're doing the best that they can do and their own format and you know their own way, then it becomes a problem because then other people say 'well no that's not how I do it in my classroom' so therefore it's filed. It's tucked away... Why waste all this work and all this information that somebody worked so hard on..." –L, 4-5

2.6 DRDPtech

DRDPtech is an online platform for inputting developmental ratings of DRDP measures and is essentially equivalent to the paper DRDP. The web interface replicates the paper-based DRDP rating forms all information fields, measures, and rating scales are the same. DRDPtech addresses the latter end of the documentation process and does not aid in the collection of evidence. The practices for recording observations discussed early have remained the same through the transition. The introduction of a method in which teachers directly input observations from memory without any intermediating steps was introduced as a result and is depicted in the figure 5 below.

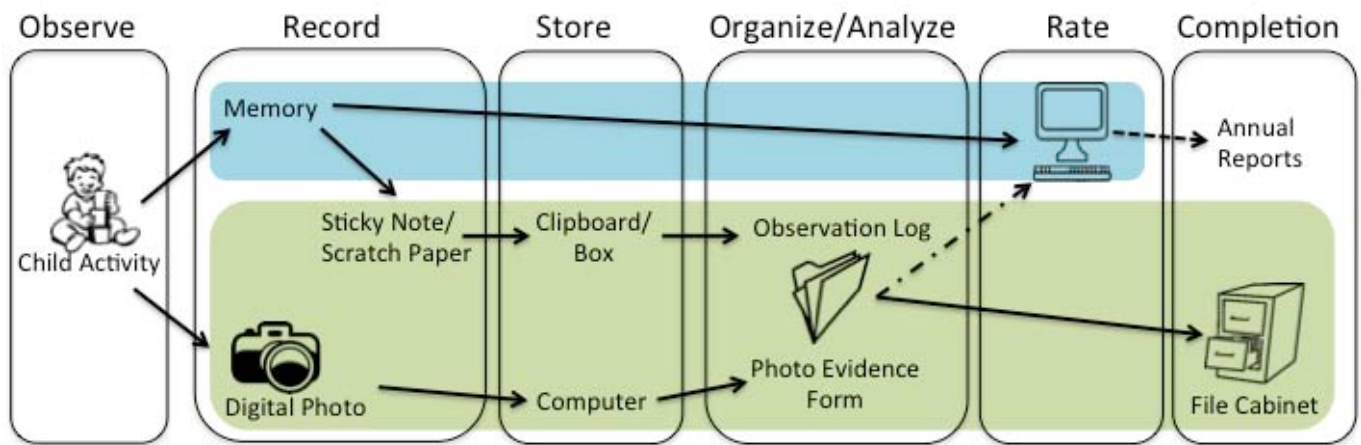


Figure 5: The process of documenting development after the introduction of DRDPtech; green highlights the unchanged practices and blue highlights new methods

2.6.1 Advantages of DRDPtech

Compiling and Condensing Information is a key affordance of DRDPtech compared to the paper format is the ability to easily display and manipulate information in one screen rather than across approximately 50 pages of paper. Reducing the amount of paper involved allows teachers to manage multiple portfolios in a more practical format. The more organized display of data also enhances the teacher’s ability to review his or her developmental ratings in one screen. The digital medium allows for teachers to manipulate the data to view at the child level, group level, and classroom level which supports the formation of classroom level and center wide goals.

“I would have to flip through a million pages and find it...now its all there and clear and sometimes paper can look messy” – A, 1-2

“it helps make you more accurate because you can see everything at the same time so it is easy to make corrections” – Q, 3-4

“it can give you a little bit of a tally...you can do it by the entire DRDP or by domains...that kind of helps me in planning what I need to do” – L, 4-5

Higher Level Organization from the administrative perspective is simpler with the introduction of DRDPtech. It has drastically reduced workload by automating classroom and center level reports that were previously recorded manually. As depicted in the figure 6 below, on the right is an example of the teacher generated classroom tallies, on the left is the output from DRDPtech.

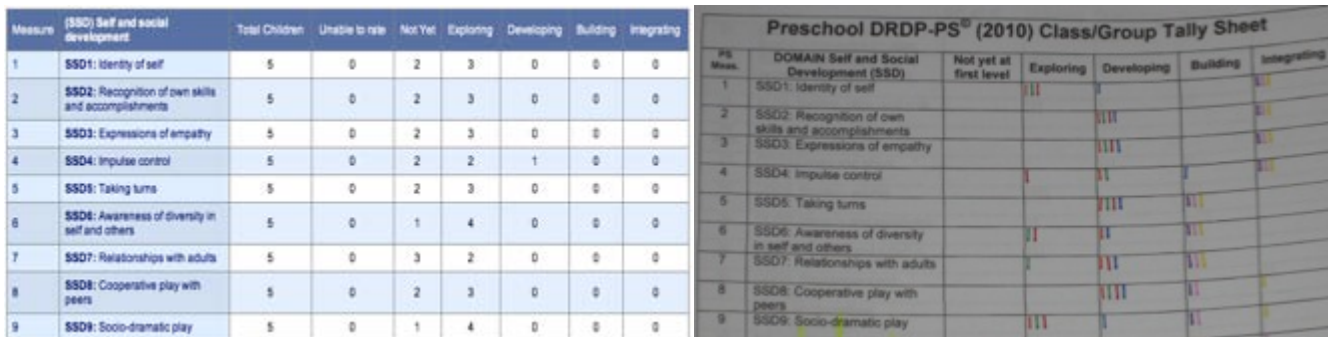


Figure 6: An example of classroom tally sheets that depict how many children are at each level for a given measure. The left is from DRDPtech and the right is created by a teacher.

2.6.2 Challenges of DRDPtech

Inability to Upload Photos is most salient concern we observed before the transition. All of the teachers express the lack of uploading photo evidence as a key concern. In an effort to remain paperless, the previously preferred form of documentation is being reduced due to inconvenience. The figure 7 below is a screen capture of how teachers use photos as evidence in DRDPtech. There is no capability to upload a photo into DRDPtech, therefore teachers cite the date of a printed photo documentation form stored in a binder in the classroom.

“what I would really like is if there is a column here for us to put pictures” – B, 4-5

“it definitely discourages photos because there is no way to upload them” – N, 2-3

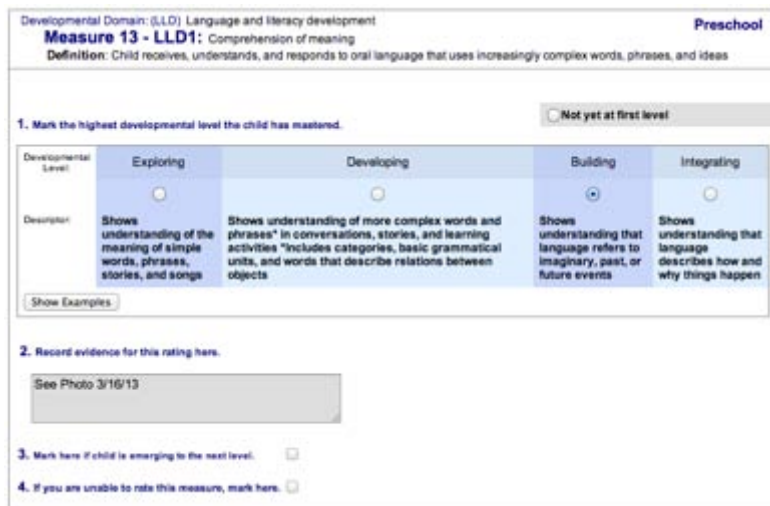


Figure 7: A screen capture of DRDPtech illustrating the inability to upload photos.

Portability is a crucial concern at this early childhood education center each classroom has a computer that is stationary and located in the corner or backroom of the classroom. With respect to this environment, it is particularly important to engaged and “on the floor” this poses a clash with the new system. Using computers requires teachers to be removed the environment and must have their role covered by a substitute teacher making it more difficult to find time to work on inputting data into DRDPtech. In contrast the paper portfolios were easy to transport.

“the computer requires my full attention, I can’t do it when the kids are here” – L, 1-2

“you can pick up your folder and carry it around the room you can just grab your folder and sit next to the child and keep working” – A, 1-2

2.6.3 Paper Persisted

In line with much of the related work, paper never fully disappears from a system and that remains true in this case. To preserve the accuracy of evidence many teachers practice the same collection method as depicted prior that involves recording observations in a log. With respect to photos, the inability to upload to DRDPtech requires that teachers print out photos to a photo documentation form and continue to store the physical copy that is no longer linked with the rating. Teachers have evolved different strategies to adjust to the transition. Some teachers follow the same method with paper and transfer it to the online system. In contrast, other teachers directly input observations into the online system without any intermediary steps. It was expressed by a teacher that this method may compromise the quality of evidence recorded.

“I have my old way and I stick to it I just do it on paper and transfer it” – L, 3-4

“I see a little bit of a risk losing the accuracy of what we’re doing if we just go by what we remember” – L, 4-5

The effort to move digital has created many inconsistencies in evidence collection and recording. These changes may pose unexpected consequences to the practice.

2.7 DRDP Companion Application

In addition to DRDPtech, there is a companion iPad application (Figure 8) that became available recently. Although it is not yet compatible with DRDPtech, one teacher at the early childhood education center participated in using the application for a week as a part of our preliminary study. Based on observations and interviews we speculate that the application can strengthen the quality of evidence at the individual level will be synced with DRDPtech soon. The application directly targets the process of evidence collection and has shown to reduce workload in our initial sample. The application provides many new opportunities for teachers such as the ability to take videos, which have the potential to be more influential for sharing than digital photos.

“the option to take video would be great for parent teacher conferences” –N, 1-2



Figure 8: Evidence collection on DRDP companion application.

Additionally, after a week of piloting the teacher mentioned that rather than an iPad for each teacher that an iPad for each classroom would be more effective by allowing teachers to tag other teacher’s children in group shots or other activities. This presents the opportunity for more sharing of information between teachers.

3. Discussion

This research follows the transition from a paper-based system to a new digital platform. We will review our key findings from before and after the transition.

3.1 Evidence Collection and Documentation Process

The primary role of the teacher is to actively engage and monitor the children. This task in addition to document developmental milestones more than demands their full attention. In the classroom setting, teachers try to allocate time to recording their observations. These limitations restrict the introduction of intricate technologies that might disrupt the flow of the classroom or take the teachers attention from the children. As a result, quick of hand methods such as jotting notes on scratch paper or taking a digital photo have evolved as practice. These methods present some distinct problems, such as misplacing a note, forgetting the details of an event, or simply not getting the camera in time to capture an activity. For many cases a digital camera is a key resource in the classroom and photos are a primary source of evidence for their many benefits such as quickly capturing an a detailed and objective account of an event. Photos provide a quick solution for in the classroom documentation, however teachers spend much time organizing and printing these photos to include in the portfolio.

There are certain measures that cannot be captured adequately in a photo, such as conversation. In these cases teachers use hand written transcriptions to document the event. The process of manually hand recording activity is time consuming and must be transferred to an observation log before included in the portfolio creating. Teachers need an efficient solution to manage the various steps involved.

Paper portfolios allow for clear linking between evidence and ratings. To develop this web of information teachers take advantage of the flexibility of paper to spread out and manipulate the many pages to highlight how data is connected. However, the uniqueness of an individual teachers portfolio can discourage sharing of information over time. Some teachers will disregard a portfolio if it has a

different format than what they use, does not contain a satisfactory level of detail, or is perceived as incorrect. These inconsistencies cause much valuable data to be wasted.

3.2 Separation of Evidence and Assessment in DRDPtech

In this early childhood education center, the developmental evidence is recorded on paper either an observation log or photo evidence form. The transition to an online documentation system for providing developmental rankings is incapable of uploading photos, a primary form of evidence, has created a separation between the supporting evidence that was previously linked with the developmental rating. Teachers will refer to a photo as evidence that is not physically linked to the rating. This disconnect is apparent to the teachers and may start to compromise the quality of the evidence recorded. For example, DRDPtech has the capability to upload text however, some of the teacher view typing a written observation as extra work and will cite their paper observation log that is also not linked to the online system.

“I could type it here again but I already have it written down so why do it twice” – Q, 3-4

As illustrated in Figure 5 the photo evidence forms and observation logs are stored separately from the developmental ratings. The administrator of the school suggests that the teachers are aware of separation of the physical evidence from the digital records.

“I think the teachers see it as two completely different systems that aren't cohesive” – R, Admin

The transition to the online system is relatively new for the center, but it can be hypothesized that the apparent separation may compromise the quality of evidence in the future. The activity of linking evidence with a measure found in the paper portfolio is an important aspect of reflection that could be lost with the new system. Additionally, the new method illustrated in figure 5 in which teachers directly transfer observations from memory to DRDPtech also poses issues for quality of evidence.

3.3 Individual versus Group Analysis

A primary strength of the paper portfolios was the focus on the individual level analysis. Each child had a binder dedicated to his or her assessments and corresponding evidence that included photos and work samples were strongly linked to the rating. This portfolio traveled with the child throughout his or her time at the Early Childhood Education Center and was added to by the various teachers encountered. The inclusion of evidence made the portfolio very personal but primarily restricted to the individual. Group analysis was possible but required much manual work such as flipping through many pages in various binders to create tallies for every child in a group.

In contrast, the key advantage of DRDPtech is the ability to easily manipulate large sets of developmental data from the group level to a center wide analysis. For example, the tallies that were created manually are now automated. This presents the opportunity to evaluate progress of many children in a classroom or at the center wide level. However, the separation of evidence from the online system caused a deficit in linking evidence with rating which creates a weakness at the individual level analysis. A teacher comments on the new system illustrating the efforts to combine children.

“with the online stuff we went from one folder per kid to one group per teacher” – N, 1-2

3.3 Insights for Design

The introduction of a mobile iPad application to aid in evidence collection poses many opportunities and has been shown to reduce teacher workload. The inclusion of video as a form of evidence allows for richer quality and serves as a space for conversation and information sharing with parents. Additionally, standardizing the process of evidence collection will create consistency in the center and promote sharing among teachers. This mobile application addresses the issue of portability and if synced with the online system, could potentially bridge the gap between evidence and assessment that has been introduced by DRDPtech. The ease of organization presented in the application may also encourage more documentation and improve the quality of evidence. This medium also supports both group level analysis and individual detail.

4. Conclusion

This research examines information sharing practices of early childhood education teachers with regard to documenting development. We describe the variety of tools used during this process, including pervasive observation notes, digital photos, and work samples. We seek a deeper understanding of how an ecology media contribute to the complex process of documenting development. After examining both the paper and digital documentation systems we discuss the key characteristics of each and propose opportunities for design. Based on interviews and observations, we find that through this transition the different medium used to record evidence shapes various characteristics of the record keeping process with respect to evidence collection and analysis. We provide insights for the transition from paper to digital media and the effects on the intention of the system's goal. This study contributes to our understanding of the divide between paper and digital media.

References

- Cadwell, L. *Bringing Learning to Life: A Reggio Approach to Early Childhood Education*. Teachers College Press, New York, NY, 2002.
- Goodwin, C. Professional vision. *American Anthropologist* 96, 3 (1994), 606.
- Goody, J. *The Interface between the Written and the Oral*. Cambridge University Press, Cambridge, 1987.
- Heath, C., and Luff, P. Documents and professional practice: “bad” organizational reasons for “good” clinical records. In *Proc of CSCW* (1996), 354–363.
- Hewett, V. Examining the reggio emilia approach to early childhood education. *Early Childhood Education* 29 (2001).
- Hollan, J., Hutchins, E., and Kirsh, D. Distributed cognition: toward a new foundation for human-computer interaction research. *ACM TOCHI* 7, 2 (2000), 174–196.
- Hutchins, E. *Cognition in the Wild*. MIT Press, 1995.
- Katz, L., and Chard, S. The contribution of documentation to the quality of early childhood education, 1996.
- Seitz, H. The power of documentation in the early childhood education classroom. *Young Children* (2008).
- Sellen, A. J., and Harper, R. *The Myth of the Paperless Office*. MIT Press, November 2001.
- Star, S., and Griesemer, J. Institutional ecology, ‘translations’ and boundary objects: Amateurs and professionals in berkeley’s museum of vertebrate zoology. *Social Studies of Science* 19 (1989).
- Suchman, L. Office procedures as practical action: Models of work and system design. *ACM Trans. on Office Information Systems* (1983).
- Wiggins, G. The case of authentic assessment. *ERIC Digest* (1990).

