The Child Care and Early Education Heart Monitor: The Intersection of Structural Quality and Process Quality Using the Contact Hour Metric As The Foundation

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Abstract

The Child Care and Early Education (CCEE) Heart Monitor (CCEEHM) is introduced as a new Integrated Program Monitoring System's Approach to assessing both structural and process quality in one platform. It builds upon the Contact Hour (CH) metric and the Key Indicator Methodology (KIM) that have been introduced in the CCEE licensing and monitoring field. The CCEEHM expands the use of the CH and KIM methods by integrating key elements from both structural and process quality into a software application that can be used by staff, licensors, and quality assessors. The CCEEHM draws indicators from licensing, regulatory compliance, quality rating and improvement systems, and other quality initiatives, such as accreditation, and professional development and technical assistance systems.

The Child Care and Early Education (CCEE) field needs a means to monitor the key elements of structural and process quality in a unified means. The theory of regulatory compliance has been suggested as a unifying framework for structural and process quality (Fiene, 2019; 2021; 2025a,b); but at a more practical level what could be used to essentially unify the monitoring and measurement of both structural and process quality. Generally, structural and process quality are measured separately from each other by using very separate and distinct tools utilized by licensing inspectors and quality observers (Kontos & Fiene, 1987). This research

paper will build off several concepts that deal with the creation of a new Contact Hour (CH) metric replacing measuring compliance with adult-child ratios while unifying structural quality with process quality. With this new unification of structural and process quality, it will help to build a more Integrated Monitoring Systems Approach (Freer & Fiene, 2023) which should go a long way in complementing the measurement strategies employed in licensing and quality rating and improvement systems that have proliferated in the child care and early education field.

Let's begin by placing some context on the title of this new Child Care and Early Education Heart Monitor. What do we mean by heart monitor? Within the research literature in determining the levels of quality generally these levels are broken into two distinctive categories, those that deal with structural quality, such as staff child ratios, group size, etc. Essentially health and safety or licensing rules and regulations. The interactions amongst the staff and children generally fall under the process quality side of the equation. But this is really the "heart" of quality. This is where the magic occurs, the so-called "dance" between the adult and the child(ren). All the structural quality rules and regulations are important in protecting children and keeping them healthy but the interaction of child and adult is where the action occurs. So what is being proposed is to combine these two categories of quality together into one system, placing the measurement and the monitoring of process quality squarely within the structural measurement strategy, the Contact Hour (CH) metric. This will be developed within this paper by fully describing the Contact Hour metric and a newly created CCEE Quality Indicator tool that will measure the quality enhancements within the Contact Hour metric and do this within an App (software application) that can be downloaded and it will produce the scores based upon

reviewing specific documents and observations within a child care and early education program. This new Child Care and Early Education Heart Monitor (CCEEHM) should be both cost effective and efficient being based upon the key indicator methodology (Fiene & Nixon, 1985) and having it developed into an App (software application) should make it particularly easy to use for licensors, assessors, or observers since all the scoring would be done by the CCEEHM App.

Let's continue by delving into the Contact Hour (CH) metric (Fiene & Stevens, 2021). The Contact Hour metric has been proposed as a more effective and efficient metric for measuring compliance with adult-child ratios and group sizes in CCEE programs. It is simple to apply by just asking 6 questions about when children arrive and leave a CCEE program and how many staff are present in a particular classroom (See the second section for the questions and algorithms). Once that is done a trapezoidal model is built in which compliance with staff child and group size rules can be determined. Regulatory compliance is determined by comparing the resultant area to an ideal level of contact between staff and children. This introductory section is followed by the tool that would be used for determining the Contact Hour metric (Section 2) as well as the Program Quality Indicators (PQI)(Section 3) that need to be measured. Also, there is a screen shot of the opening page of the CCEEHM App that has been designed to measure compliance with the tools for CH and PQI at the end of Section 3.

In determining the results, the Contact Hours (CH) are dealt with as absolute values but let's enhance this result by moving it from an absolute value to one that is more relative by introducing process quality measures such as the Program Quality Indicators (PQI). The PQI portion of the tool has a good deal of observations that need to be made in classrooms. To do this, it would take 1000's of observations to fill the Contact Hour trapezoidal model which is not

realistic. But let's let Artificial Intelligence (AI) do the observing and training of AI in what constitutes the various quality levels on the respective CH/PQI tool. By using AI and having video cameras in each of the classrooms to be assessed, this becomes doable. The CH/PQI observer would be able to collect the data by observing and assessing what it sees via the video cameras installed in the classrooms. Summary measurements would be made on an hourly basis and recorded as part of the Contact Hour trapezoidal model. At the end of the day, there would be a relative value utilized in this model rather than the absolute value that has been used in the past to determine structural quality compliance with adult-child ratio and group size. For example, if a CCEE program classroom exceeded the area of the trapezoidal model it would be out of compliance and if it were within the area of the trapezoidal model it was in compliance (see Section 2). By adding the PQI data, it changes this metric totally by adding process quality measures which can be measured on a 1-4 ordinal scale, similar to accreditation systems or an ordinal (1-7) scale, similar to many program quality tools, such as the Environmental Rating Scales (see Section 3).

This approach will get at the ***Heart of CCEE monitoring, "process quality"***, measuring the interactions amongst staff and children in an ongoing fashion. It moves the needle from being structural to process quality providing an intersection of both components of quality. The AI approach will also help to address the issues related to bias in regulatory compliance observing and decision making by inspectors/observers. By training the AI PQI Observers there should be greater certainty established in making the right decisions related to specific quality elements (Fiene, 2025c). Just as in establishing inter-rater reliability with human observers, the same can be done with the PQI AI Observers but there will be less drift with AI.

The next section describes the Contact Hour Metric methodology in detail. Section 3 provides the Program Quality Indicators (PQI) that are part of the CCEEHM App. These two sections are the meat of the new Integrated Program Monitoring Systems Approach. In fact a human observer could use these two sections and then manually use the CCEEHM App for doing their data entry. The App would then do all the scoring for the individual assessor (See Section 3).

Section 2: Contact Hour (CH) Metric

One starts the Contact Hour (CH) metric methodology by asking the following six questions (The six questions should be asked of each grouping that is defined by a classroom or a well-defined group within each classroom tied to a specific adult-child ratio.):

1.When does your first teaching staff arrive or when does your facility open (TO1)?
2.When does your last teaching staff leave or when does your facility close (TO2)?
3.Number of teaching/caregiving staff (TA)?
4.Number of children on your maximum enrollment day (NC)?
5.When does your last child arrive (TH1)?
6.When does your first child leave (TH2)?

After getting the answers to these questions, the following formulae can be used to determine contact hours (CH) based upon the relationship between when the children arrive and leave (TH) and how long the facility is open (TO):

$$CH = ((NC\ (TO + TH)) / 2) / TA;$$

$$CH = (NC \times TO) / TA;$$

$$CH = ((NC \times TO) / 2) / TA;$$

$$CH = (NC^2) / TA$$

Where: CH = Contact Hours; NC = Number of Children; TO = Total number of hours the facility is open (TO2 - TO1); TA = Total number of teaching staff, and TH = Total number of hours at full enrollment (TH2 - TH1).

By knowing the number of contact hours (CH) it will be possible to rank order the exposure time of adults with children. Theoretically, this metric could then be used to determine that the greater contact hours is correlated with the increased non-regulatory compliance with adult-child ratios as determined in the below table (Table 1).

Table 1: Contact Hour (CH) Conversion Table (RS Model(1.0)) (Fiene, 2020©)

Taking into Account Exposure Time and Density

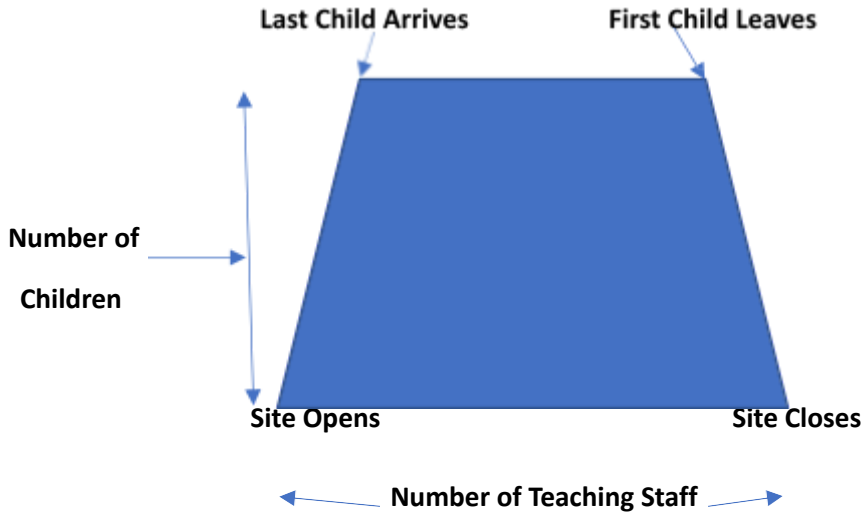
Group Size, Staff Child Ratio, Number of Children and Staff

<---------- Adult-Child Ratios (Relatively Weighted Contact Hours)---------->

NC	CH	1:1	2:1	3:1	4:1	5:1	6:1	7:1	8:1	9:1	10:1	11:1	12:1	13:1	14:1	15:1
1	8	**8**	8	8	8	8	8	8	8	8	8	8	8	8	8	8
2	16	**8**	**16**	16	16	16	16	16	16	16	16	16	16	16	16	16
3	24	**8**	12	**24**	24	24	24	24	24	24	24	24	24	24	24	24
4	32	**8**	**16**	16	**32**	32	32	32	32	32	32	32	32	32	32	32
5	40	**8**	13	20	20	**40**	40	40	40	40	40	40	40	40	40	40
6	48	**8**	**16**	**24**	24	24	**48**	48	48	48	48	48	48	48	48	48
7	56	**8**	14	19	28	28	28	**56**	56	56	56	56	56	56	56	56
8	64	**8**	**16**	21	**32**	32	32	32	**64**	64	64	64	64	64	64	64
9	72	**8**	14	**24**	24	36	36	36	36	**72**	72	72	72	72	72	72
10	80	**8**	**16**	20	27	**40**	40	40	40	40	**80**	80	80	80	80	80
11	88	**8**	15	22	29	29	44	44	44	44	44	**88**	88	88	88	88
12	96	**8**	**16**	**24**	**32**	32	**48**	48	48	48	48	48	**96**	96	96	96
13	104	**8**	15	21	26	35	35	52	52	52	52	52	52	**104**	104	104
14	112	**8**	**16**	22	28	37	37	**56**	56	56	56	56	56	56	**112**	112
15	120	**8**	15	**24**	30	**40**	40	40	60	60	60	60	60	60	60	**120**
16	128	**8**	**16**	21	**32**	32	43	43	**64**	64	64	64	64	64	64	64
17	136	**8**	15	23	27	34	45	45	45	68	68	68	68	68	68	68
18	144	**8**	**16**	**24**	29	36	**48**	48	48	**72**	72	72	72	72	72	72
19	152	**8**	15	22	30	38	38	51	51	51	76	76	76	76	76	76
20	160	**8**	**16**	23	**32**	**40**	40	53	53	53	**80**	80	80	80	80	80
21	168	**8**	15	**24**	28	34	42	**56**	56	56	56	84	84	84	84	84
22	176	**8**	**16**	22	29	35	44	44	59	59	59	**88**	88	88	88	88
23	184	**8**	15	23	31	37	46	46	61	61	61	61	92	92	92	92
24	192	**8**	**16**	**24**	**32**	38	**48**	48	**64**	64	64	64	**96**	96	96	96
25	200	**8**	15	22	29	**40**	40	50	50	67	67	67	67	100	100	100
26	208	**8**	**16**	23	30	35	42	52	52	69	69	69	69	**104**	104	104
27	216	**8**	15	**24**	31	36	43	54	54	**72**	72	72	72	72	108	108
28	224	**8**	**16**	22	**32**	37	45	**56**	56	56	75	75	75	75	**112**	112
29	232	**8**	15	23	29	39	46	46	58	58	77	77	77	77	77	116
30	240	**8**	**16**	**24**	30	**40**	**48**	48	60	60	80	80	80	80	80	**120**

This table is based upon the assumptions that the child care is 8 hours in length (TO) and that the full enrollment is present for the full 8 hours (TH). This is unlikely to ever occur but it gives us a reference point to measure adult child contact hours in the most efficient manner. Based upon the relationship between TO and TH based upon the algorithms, select from one of the formulae from the previous page (formulae 1 - 4) to determine how well the actual Relatively Weighted Contact Hours (RWCH) match with this table. If the RWCH exceed the respective RWCH in this table, then the facility would be over ratio on ACR standards, in other words, they would be overpopulated.

Figure 1: Contact Hour Diagram Paradigm and Schematic



The above diagram (Figure 1) depicts how the number of staff and children help to construct the contact hour formula. Depending on when the children arrive and leave could change the shape from a trapezoid to a rectangle or square or triangle. Please see the following potential density distributions which could impact these changes in the above contact hour diagram.

Potential Density Distributions
Taking into Account Number of Children, Staff, and Exposure Time

Here are some basic key relationships or elements related to the Contact Hour (CH) methodology.

- RWCH = ACR
- CH = GS = NC
- NC and CH are highly correlated
- ACR and GS are static, not dynamic
- CH makes them dynamic by making them 2-D by adding in Time (T)
- ΣACR = GS
- GS = total number of children NC
- ACR = children / adult

ACR = Adult Child Ratio, GS = Group Size, RWCH = Relatively Weighted Contact Hours, NC = Number of Children.

Possible Density Displays of Contact Hours (Horizontal Axis = Time (T); Vertical Axis = NC):

This density distribution should result in the lowest CH but probably not very likely to occur. Essentially what would happen is that full enrollment would be a single point which means that the last child arrives when the first child is leaving. Very unlikely but possible.

This density distribution is probably the most likely scenario when it comes to CH in which the children gradually, albeit rather steeply, arrive at the facility and also leave the facility gradually. They don't all show up at the same time nor leave at the same time. However, the arriving and leaving will be a rather close time frame.

This scenario is unlikely but is used as the reference point for CH because it provides the most efficient model. This is where all the children arrive and leave at the same time. Very unlikely, but I guess it could happen. The important element here is its efficiency in that all contact hours are covered, so although a lesser amount of CH is not as efficient it does demonstrate compliance with ACR and GS which is one of the purposes of CH. As the bottom two distributions will demonstrate, CHs above this level would either depict a program that is open for an extended time or where there are too many children present and the facility is out of compliance with GS and/or ACR.

This distribution would indicate that the facility is open for an extended time and exceeds the number of total CH as depicted in the reference square standard. Although not out of compliance with GS or ACR, this could become a determining factor when looking at the potential overall exposure of adults and children when we are concerned about the spread of an infectious diseases, such as what happened with COVID19. Are facilities that are high on a CH measurement more prone to the spread of infectious diseases?

This depiction clearly indicates a very high CH and non-compliance with ACR and GS. This is the reason for designing the CH methodology which was to determine these levels of regulatory compliance as its focus.

Section 3: Program Quality Indicators

This section provides the program quality indicators (PQI) which along with the previous section dealing with staff child ratios and group sizes constitutes the new Integrated Program Monitoring system: CCEE Heart Monitor (CCEEHM App). These PQI were validated in a study in the province of Saskatchewan (Fiene, 2024).

The PQI represents staffing, program, parental involvement and key interactional observation indicators drawn from key indicator studies from 1980 - 2020 involving quality rating and improvement systems (QRIS), professional development, and program quality initiative observational studies. These indicators provide the process quality within the context of the structural quality provided by the contact hour metric depicted in the previous section. Both the contact hour and these PQI are intended to be used in an integrated fashion and compliance should be measured on both domains. By doing this a picture of structural and process quality will be possible.

By utilizing this new integrated program monitoring system it will provide a cost effective and efficient system for jurisdictions around the world. These metrics are based upon research studies completed in the USA and Canada from 2020-2024 (Fiene, 2025a,b,c).

INDICATOR 1): Number of ECE III Educators (AA and BA Level ECE Educators)

AI will review staff records to determine the number of staff who have these credentials in early childhood education. Record the number of ECEs with the appropriate qualifications and divide them by the total number of ECEs to come up with a percent for the center.

How to Measure:

Go to a Staff Information Summary form to obtain the data for this item. Under Certification, look for the following: Certification Date and Certification Level (Highest ECE Level Certified). The certification date should be earlier than the date of the review and the actual level of the certification. In this case, we are interested in the number of (ECEIII's). Record the number of ECEIII working at least 65 hours/month. Then record the number of total teaching staff working at least 65 hours/month below as well. Teaching staff is defined as staff who have a responsibility for working with the children and the programming. Determine the percentage by dividing the total number of staff into the total number of ECEIII Certified teaching staff, ECEIII Certified teaching staff is the numerator, and the total number of teaching staff is the denominator (ECEIII/Total number of teaching staff x 100% = Percent).

Scoring for PQI 1:

The total number of ECEIII Certified teaching staff _____(1.1)

The total number of teaching staff _____(1.2)

Total ECEIII teaching staff divided by the total number of teaching staff _____

(%). Then based on the percentage, you can find the score of 1-4 as per the chart below.

Circle the Appropriate Level	***1 = 0 to 25%***	***2= 26 to 50%***	***3 = 51 to 75%***	***4 = 76 to 100%***

INDICATOR 2): Stimulating and Dynamic Environment

The criteria for measuring this are drawn from Play and Exploration Guides that should be present in all CCEE programs. The program should be child centered. Children are viewed as competent learners, and they have the freedom to access classroom materials independently without adult intervention. The children are provided with meaningful choices through activity/learning centers. There is evidence of the children's interests and their projects in the learning environment.

How to Measure:

Below is the checklist of items that should be present to assess if the environment is both stimulating and dynamic for the children. You will want to observe that the following items are occurring in the classroom first. If you do not actually observe it occurring, then check the program plan to find documentation that it normally occurs but you just did not observe today. The checklist items would be found in *Play and Exploration* foundational materials.

Quality Early Learning Environments (Please record all that you observe Y or N):

1. Co-teaching is evident. Y/N _____(2.1)
2. Children are viewed as competent learners & can access materials independently. Y/N ____(2.2)
3. Authentic and meaningful materials are used with children. Y/N _____(2.3)
4. Children are provided with meaningful choices. Y/N _____(2.4)
5. Children's work, art and photos are displayed respectfully. Y/N _____(2.5)
6. Family photos are displayed in the early learning program. Y/N _____(2.6)
7. Documentation of learning is displayed and discusses holistic development. Y/N _____(2.7)
8. Environment reflects the culture and beliefs of the children, families and staff. Y/N _____(2.8)
9. Variety of books & other print materials are available throughout the classroom Y/N _____(2.9)
10. A variety of writing materials are accessible to children most of the time. Y/N _____(2.10)
11. There is evidence of the children's interests & projects in the classroom. Y/N _____(2.11)

Scoring for PQI 2:

Total up the number of items where you recorded a "Y" above that you observed (curriculum or in classrooms), divide by 11 x 100% to come up with a percent and record here _____%. Then based on the percentage, you can find the score of 1-4 as per the chart below.

Circle the Appropriate Level	***1 = 0 to 25%***	***2= 26 to 50%***	***3 = 51 to 75%***	***4 = 76 to 100%***

INDICATOR 3): Developmentally Appropriate Curriculum Based on Assessments of Each Child

The key for this quality key indicator is that the program is following an individualized prescribed planning document when it comes to curriculum. It does not mean it is a canned program, in fact, it shouldn't if it is based upon the individual needs of each child's developmental assessment. The assessor will ask to see what is used to guide the curriculum. There should be a written document that clearly delineates the parameters of the philosophy, activities, guidance, and resources needed for the particular curricular approach. There should also be a developmental assessment which is clearly tied to the curriculum. The developmental assessment can be home-grown or a more standardized off-the-shelf type of assessment, the key being its ability to inform the various aspects of the curriculum. The purpose of the assessments is not to compare children but rather to compare the developmental progress of individual children as they experience the activities of the curriculum.

The following key elements should be present when assessing this quality indicator.

- 1) The program practices emergent curriculum, allowing the interests of the children to determine the learning content. The curriculum is informed by individual developmental assessments of each child in the respective classrooms.
- 2) The children and educators are co-learners in the exploration of projects.
- 3) Learning activities of the children are documented, displayed in the learning environment and used to plan further learning activities. This can be assessed developmentally.

How to Measure:

Take a sample of 10 individual children's records and consider the above three elements for EACH record. You should be asking yourself if there is a clear link between an assessment and the developmentally appropriate curriculum so that an individualized learning approach is being undertaken and each child's developmental needs are taken into consideration. These records could be formal, such as portfolios kept for each child or a more informal, anecdotal type of record keeping. The key is that there is a record that can be looked at. It is not adequate if the teacher says they do it from memory – it needs to be written down and documented.

Cross check the child's record to the actual curriculum. Record all the instances (Y's) in which this occurs. All three blocks need to be checked for each record (1-10).

Emergent Curriculum is Practiced (3.1)

1 Y/N	2 Y/N	3 Y/N	4 Y/N	5 Y/N	6 Y/N	7 Y/N	8 Y/N	9 Y/N	10 Y/N

Key Element 1 +

Children and Educators are Co-learners (3.2)

1 Y/N	2 Y/N	3 Y/N	4 Y/N	5 Y/N	6 Y/N	7 Y/N	8 Y/N	9 Y/N	10 Y/N

Key Element 2 +

Learning Activities are Documented and Displayed and Used to Plan Future Learning (3.3)

1 Y/N	2 Y/N	3 Y/N	4 Y/N	5 Y/N	6 Y/N	7 Y/N	8 Y/N	9 Y/N	10 Y/N

Key Element 3 +

All three key elements must have a Y to get an overall score of Y. If all three key elements have a Y for that individual record, then record Y in the corresponding block in the overall score.

1 Ys =	2 Ys =	3 Ys =	4 Ys =	5 Ys =	6 Ys =	7 Ys =	8 Ys =	9 Ys =	10 Ys =

= Total of All Three Key Elements (3.4)

Scoring for PQI 3:

The number of positive records (all Ys for all three elements) where there is a crosswalk from developmental assessment to curriculum _____

Percent of positive records (all Ys) (divide the number of positive records by 10 x 100%) _____%. Then based on the percentage, you can find the score of 1-4 as per the chart below.

Circle the Appropriate Level	*1 = 0 to 25%*	*2= 26 to 50%*	*3 = 51 to 75%*	*4 = 76 to 100%*

INDICATOR 4): Opportunities for Staff and Families to Get to Know Each Other

There should be activities both within the center as well as off site where staff and parents have opportunities to meet and greet each other. Communication with family members is documented and enables early childhood providers to assess the need for follow-up. Early childhood providers hold regular office hours when they are available to talk with family members either in person or by phone. Family members are encouraged to lead the conversation and to raise any questions or concerns.

How to Measure:

Look for the following 3 examples in policies developed by the program and determine if they have been carried out with families. It will be necessary to interview staff to complete this indicator if you do not find the three examples in policies:

1. The program provides communication, education, and informational materials & opportunities for families that are delivered in a way that meets their diverse needs. Y/N_____(4.1)
2. The program communicates with families using different modes of communication, and at least one mode promotes two-way communication. Y/N _____(4.2)
3. The program demonstrates respect and engages in ongoing two-way communication. The program respects each family's strengths, choices, & goals for their children. Y/N _____(4.3)

Scoring for PQI 4:

Record the number of Yes's (Y's): _____(Range: 0 – 3) (Divide by 3 x 100% = _____%). Then based on the percentage, you can find the score of 1-4 as per the chart below.

Circle the Appropriate Level	*1 = 0 to 25%*	*2= 26 to 50%*	*3 = 51 to 75%*	*4 = 76 to 100%*

INDICATOR 5): Families Receive Information on Their Child's Progress Regularly Using a

Formal Mechanism

Based upon Indicator #3 above, the information gleaned from the developmental assessments should be the focus of the report or parent conference. Parental feedback about the assessment and how it compares to their experiences at home would be an excellent comparison point. All these interactions should be done in a culturally and linguistically appropriate way representing the parents being served.

How to Measure:

Look for the following four examples in policies developed by the program and determine if they have been carried out with families. Record the number of reports completed or parent conferences over the past year. It will be necessary to interview staff to complete this indicator if you cannot determine from records that the conferences or reports were completed.

- 1) The program does have regularly scheduled (at least 2xs/year) parent conferences in which the children's developmental progress is discussed AND provides the family with a report of their child's developmental progress. Y/N _____(5.1) (Score 3 points). If "Yes" then go to Number 4. If "No", then go to numbers 2 and 3.
- 2) The program has regularly scheduled (at least 2xs/year) parent conferences in which the children's developmental progress is discussed, but it does not provide a report to the parents on their child's developmental progress. Y/N _____(5.2) (Score 2 points).
- 3) If the program does not have regularly scheduled (at least 2xs/year) parent conferences, does it provide the family with a report of their child's developmental progress. Y/N _____(5.3) (Score 1 point). Go to Number 4.
- 4) All these interactions are done in a culturally and linguistically appropriate way representing the parents being served. Y/N _____(5.4) (Score 1 point)

Scoring for PQI5:

Add up the total points based on the Ys; this will range from "0" to "4". The only way a program can receive a "4", is if a program has regularly scheduled parent conferences at least 2xs/year and provides the family with a report of their child's progress; and it is done in a culturally and linguistically appropriate way.

Record the number of points: _____(Range: 0 - 4)

Total Score for Part 1 = _____

PART 2 - OBSERVATIONS:

INDICATOR 6): Educators Encourage Children to Communicate (Preschool Class)

Assessors will need to observe this item when they do their classroom observations. Initially you can ask educators or the director how children are encouraged to communicate but in order to gather reliable and valid information regarding this question/standard, it needs to be observed in the various interactions between staff and children. Things to look for would be more back and forth conversations rather than one-way conversations where educators are telling children what to do. Look for opportunities where children can describe what they are doing, how they feel about what they are doing, and why they are doing particular activities. Educators expand upon children's conversation.

These opportunities can occur anywhere in the classroom or outside, such as in dramatic play, tabletop activities or on the playground. Materials should be present that encourage communication such as toy telephones, puppets, flannel boards, dolls and dramatic play props, small barns, fire stations, or dollhouses. These create a lot of conversation among children as they assume many different roles.
Children also talk when there is an interested person who listens to them. The staff in a high-quality early childhood classroom will use both activities and materials to encourage growth in communication skills.

How to Measure:

Observe the classroom for a minimum of 15 minutes. Once completed, consider where the classroom

falls based on the following scale;
Score the classroom a 1 if the following occur:

- No activities used by staff with children to encourage them to communicate, for example: non talking about drawings, dictating stories, sharing ideas at circle time, finger plays, singing songs. Y/N _____(6.1)
- Very few materials accessible that encourage children to communicate. Y/N _____(6.2)

Score the classroom a 2 if the following occur (If the classroom does not have all 3 indicators but has 2 of the indicators then score this item 1+):

- Some activities are used by staff w/children to encourage them to communicate. Y/N _____ (6.3)
- Some materials are accessible to encourage children to communicate. Y/N _____(6.4)
- Communication activities are generally appropriate for the children in the group. Y/N _____ (6.5)

Score the classroom a 3 if the following occur (If the classroom does not have both indicators but has one of the indicators then score this item 2+):

- Communication activities take place during both free play and group times, for example: child dictates story about painting; small group discusses trip to store. Y/N _____(6.6)
- Materials that encourage children to communicate are accessible in a variety of interest centers, for example: small figures and animals in block area; puppets and flannel board pieces in book area; toys for dramatic play outdoors or indoors. Y/N _____(6.7)

Score the classroom a 4 if the following occur (If the classroom does not have both indicators but has one of the indicators then score this item 3+):

- Staff balance listening and talking appropriately for age and abilities of children during communication activities, for example: leave time for children to respond; verbalize for child with limited communication skills. Y/N _____(6.9)
- Staff link children's spoken communication with written language, for example: write down what children dictate & read it back to them; help them write notes to parents. Y/N _____ (6.10)

Scoring for PQI 6:

Total up the number of "Y's" and record the appropriate level. In order for a classroom to receive a particular score, all "Y's" must be checked for the appropriate level (1 - 4) from above or partial credit given in order to obtain a "+". If there is a "+" please also mark it in the box.

Circle the Appropriate Level	***1***	***2***	***3***	***4***

INDICATOR 7): Infant Toddler Observation (if applicable) **(Infant Classroom)**

Conversations and questions should be used with all children, even young infants. Conversations using verbal and nonverbal turn-taking should be considered when scoring. Most conversations and questions initiated by infants will be nonverbal, such as widening of baby's eyes or waving arms and legs. Observe staff response to such nonverbal communication. For infants and toddlers, the responsibility for starting most conversations and asking questions belongs to the staff. As children become more able to initiate communication, staff should modify their approach in order to allow children to take on a greater role in initiating conversations and asking questions. Staff should provide answers to questions used by children if children cannot answer, and as children become more able to respond, questions should start to include those that the child can answer. If there was not an infant classroom, skip this Indicator and please note that here and on the summary score sheet by marking N/A: _____

How to Measure:

Observe the classroom for a minimum of 15 minutes. Once completed, consider where the classroom falls based on the following scale;

Score the classroom a 1 if the following occurs:

- Staff never initiate turn-taking conversations with children, for example: rarely encourage baby to babble back; simple back and forth exchanges with verbal children never observed. Y/N _____(7.1)
- Staff questions are often not appropriate for children, or no questions are asked, for example: too difficult to answer; carry a negative message. Y/N _____(7.2)
- Staff respond negatively when children can't answer questions, for example: "You should know this"; "You did not listen". Y/N _____(7.3)

Score the classroom a 2 if the following occurs (If the classroom does not have all 3 indicators but has 2 of the indicators then score this item 1+):

- Staff sometimes initiate conversations with children, for example: babble back and forth with baby; copy baby's sounds; respond to baby's crying with verbal response; have short back and forth toddler interactions. Y/N _____(7.4)
- Staff sometimes ask children appropriate questions and wait for the child to respond, for example: ask baby if she likes toy and pay attention as baby smiles; ask toddler what he is eating and wait for him to think of word. Y/N _____(7.5)
- Staff respond neutrally or positively to children who can't answer questions. Questions asked are sometimes meaningful to children, for example: child responds with interest; does not ignore staff questions. Y/N _____(7.6)

Score the classroom a 3 if the following occurs (If the classroom does not have all 4 indicators but has 2 or more of the indicators then score this item 2+):

- Staff initiate engaging conversations with children throughout the observation, for example: show enthusiasm; use tone that attracts child's attention. Y/N _____(7.7)
- Staff often personalize questions and/or conversations for individual children, for example: talk about children's families, preferences, interests; what they are playing with; what they did over weekend; child's mood; use child's name. Y/N _____(7.8)

- Staff often pay attention to children's questions, verbal or nonverbal, and answer in a satisfying manner for the child. Y/N _____(7.9)
- Staff ask questions in which children show interest in answering, for example: make the questions funny or mysterious; use attractive tone; meaningful and not too difficult to answer. Y/N _____(7.10)

Score the classroom a 4 if the following occurs (If the classroom does not have both indicators but has one of the indicators then score this item 3+):

- Staff frequently have turn taking conversations with children throughout the observations. Many appropriate questions are used throughout the observation, during both play and routines. Y/N _____(7.11)
- Staff ask children appropriate questions, wait a reasonable time for child response, and then answer if needed, for example: "Are you hungry? . . . Yes, you are!"; "Where's the ball? . . . These it is! You found the ball". Y/N _____(7.12)

Scoring for PQI 7:

Total up the number of "Y's" and record the appropriate level. For a classroom to receive a particular score, all "Y's" must be checked for the appropriate level (1 - 4) from above or partial credit given in order to obtain a "+".

Circle the Appropriate Level	***1***	***2***	***3***	***4***

INDICATOR 8): Educators Use Language to Develop Reasoning Skills (Preschool)

Assessors will need to observe very carefully as this standard can be difficult to determine because it is tying language and cognition together. Again, this opportunity can occur in any setting in or out of the classroom because it is the basis for problem solving through the use of language. Also look for educators redirecting children's conversations when appropriate. Staff should use language to talk about logical relationships using materials that stimulate reasoning. Through the use of materials, staff can demonstrate concepts such as same/different, classifying, sequencing, one-to-one correspondence, spatial relationships, and cause and effect.

How to Measure:

Observe the classroom for a minimum of 15 minutes. Once completed, consider where the classroom falls based on the following scale;

Score the classroom a 1 if the following occur:

- Staff do not talk with children about logical relationships, for example: ignore children's questions and curiosity about why things happen, do not call attention to sequence of daily events, differences and similarity in number, size, shape, cause and effect. Y/N _____(8.1)
- Concepts are introduced inappropriately, for example: concepts too difficult for age and abilities of children, inappropriate teaching methods used such as worksheets without any concrete experiences; teacher gives answers w/o helping children to figure things out. Y/N _____(8.2)

Score the classroom a 2 if the following occur (If the classroom does not have both indicators but has one of the indicators then score this item 1+):

- Staff sometimes talk about logical relationships or concepts, e.g.: explain that outside time comes after snacks, point out differences in sizes of blocks children use. Y/N _____(8.3)

- Some concepts are introduced appropriately for ages and abilities of children in group, using words and experiences, for example: guide children with questions and words to sort big and little blocks or to figure out why ice melts. Y/N _____(8.4)

Score the classroom a 3 if the following occur (If the classroom does not have both indicators but has one of the indicators then score this item 2+):

- Staff talk about logical relationships while children play with materials that stimulate reasoning, for example: sequence cards, same/different games, size and shape toys, sorting games, numbers and math games. Y/N _____(8.5)
- Children are encouraged to talk through or explain their reasoning when solving problems, for example: why they sorted objects into different groups, in what way two pictures are the same or different. Y/N _____(8.6)

Score the classroom a 4 if the following occur (If the classroom does not have both indicators but has one of the indicators then score this item 3+):

- Staff encourage children to reason throughout the day, using actual events and experiences as a basis for concept development, e.g.: children learn sequence by talking about their experiences in the daily routine or recalling the sequence of a cooking project. Y/N _____(8.7)
- Concepts are introduced based upon children's interests or needs to solve problems, for example: talk children through balancing a tall block building, help children figure out how many spoons are needed to set a table. Y/N _____(8.8)

Scoring for PQI 8:

Total up the number of "Y's" and record the appropriate level. In order for a classroom to receive a particular score, all "Y's" must be checked for the appropriate level (1 - 4) from above or partial credit given in order to obtain a "+".

Circle the Appropriate Level	***1***	***2***	***3***	***4***

For quality key indicators 9 and 10 it is recommended that these be assessed/observed throughout the observation period and not just during key activity times. These two quality key indicators should be observed in two-minute blocks over ten sequences for a total of 20 minutes. These two items should also be used with each age group being assessing.

INDICATOR 9): Educators Listen Attentively When Children Speak

This quality indicator focuses on the early childhood educator(s) looking directly at the children with nods, rephrasing their comments, and engaging in conversations. Children should have the undivided attention of the specific educator they are addressing. Educators should not be looking away or pre-occupied with others. They should be at the child's level making eye contact. The intent is to observe all children and educators in the room.

How to Measure:

Do this in timed 2-minute observations recording each time you observe this occurring. Record at least 10 different observation periods. These do not need to be consecutive in order to fully observe classrooms and educators. Please use the following scale to assess your recordings: Likert Scale (1-4) where 1 = Never/Not at All; 2 = Somewhat/Few Instances; 3 = Quite a Bit/Many Instances; 4 = Very Much/Consistently):
Make the actual recordings using the Likert Scale (1-4) above for each individual observation and record in each cell below.

09 Observations:

09.1	2	3	4	5	6	7	8	9	09.10

Scoring for PQI 9:

Once all the observations are made, add up the results from the Likert Scale (1-4) and record the total number here: _____(Range: 10 - 40)(Divide this result by 10) = _____(1-4)(Round upward or downward to the whole number (3.7 = 4; 2.2 = 2)).

Circle the Appropriate Level	***1***	***2***	***3***	***4***

INDICATOR 10): Educators Speak Warmly to Children

This quality indicator focuses on the early childhood educator(s) always engaging in a caring voice and body language with every child. Educators do not use harsh language or commands in speaking to children, but rather again are on the child's level making eye contact. Think of the way Fred Rogers would engage his audience where you always felt you were the most important person in the world when he talked to the TV.

How to Measure:

Do this in timed 2-minute observations recording each time you observe this occurring. Record at least 10 different observation periods. Please use the following scale to make your recordings: (This item is on a Likert Scale (1-4) where 1 = Never/Not at All; 2 = Somewhat/Few Instances; 3 = Quite a Bit/Many Instances; 4 = Very Much/Consistently):
Make the actual recordings using the Likert Scale (1-4) above for each individual observation and record in each cell below.
10 Observations:

10.1	2	3	4	5	6	7	8	9	10.10

Scoring for PQI 10:

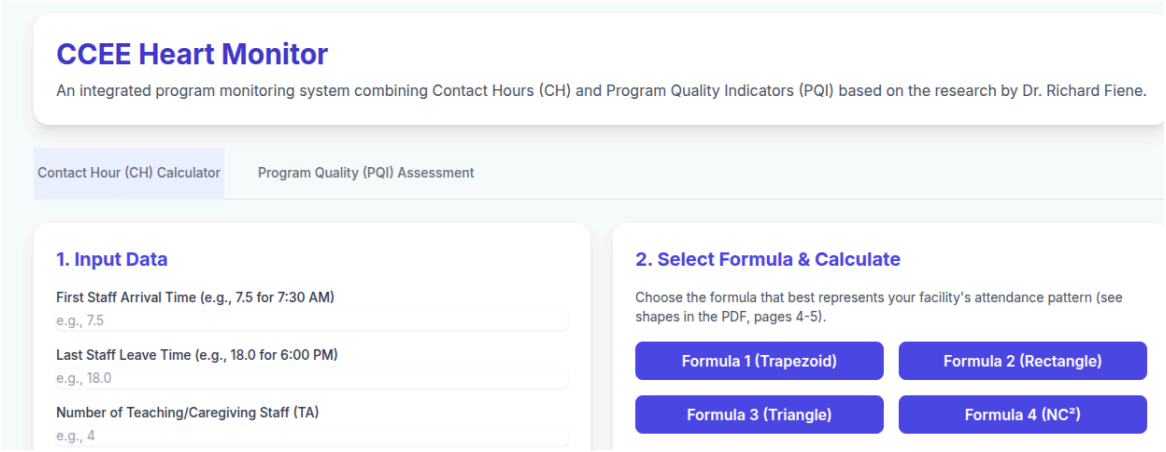
Once all the observations are made, add up the results from the Likert Scale (1-4) and record the total number here: _____(Range: 10 - 40) (Divide this result by 10) = _____(1-4). (Round upward or downward to the whole number (3.7 = 4; 2.2 = 2)).

Circle the Appropriate Level	***1***	***2***	***3***	***4***

Program Quality Indicators Artificial Intelligence (PQIAI) Scoring Protocol

LEVEL	Standardized Scores	Actual Scores
High Quality	**Mixed Age: 36+** **Preschool: 32+** **Infant-Toddler: 28+**	Mixed Age: _____ Preschool: _____ Infant-Toddler: _____
High - Mid Quality	**Mixed Age: 30 – 35** **Preschool: 26 - 31** **Infant-Toddler: 22 - 27**	Mixed Age: _____ Preschool: _____ Infant-Toddler: _____
Mid – Low Quality	**Mixed Age: 20 – 29** **Preschool: 16 - 25** **Infant-Toddler: 12 - 21**	Mixed Age: _____ Preschool: _____ Infant-Toddler: _____
Low Quality	**Mixed Ages: 19 or less** **Preschool: 15 or less** **Infant-Toddler: 11 or less**	Mixed Age: _____ Preschool: _____ Infant-Toddler: _____

Here is the opening screen to the Child Care and Early Education Heart Monitoring App (CCEEHM):



Here is the CCEE Heart Monitor Application: The ***Child Care and Early Education Integrated Program Monitoring System.*** It has two main sections, accessible through tabs:

1. **Contact Hour (CH) Calculator:** Input your facility's operational data to calculate the Contact Hour metric, which helps in analyzing structural quality. You can also include square footage for an expanded calculation.
2. **Program Quality (PQI) Assessment:** Go through the 10 indicators to evaluate the process quality of an early education program. The tool will automatically score each indicator and provide a final quality level based on the age group you select.

You can fill out the forms in each section and the application will compute the results for you in real-time. The tools that go along with these forms are appended to this document after the source code. You will need the tools for data collection and for interpreting the results from the Application so review these before opening the App. It will help familiarize you with the key data elements and the scoring system for this program monitoring systems approach.

The link to the CCEE Heart Monitor:

https://g.co/gemini/share/f82331a1f083

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Biography

Dr Richard Fiene, a research psychologist, has spent his professional career in improving the quality of child care in various states, nationally, and internationally. He has done extensive research and publishing on the key components in improving child care quality through an Early Childhood Program Quality Indicator Model (ECPQIM) of training, technical assistance, quality rating & improvement systems, professional development, mentoring/coaching, regulatory science, licensing, risk assessment, differential program monitoring, key indicators, and accreditation. His research has also made significant contributions in regulatory science related to measurement and monitoring systems, such as instrument-based program monitoring, differential monitoring, key indicator methodology for compliance and quality, and risk assessment methodology. In prevention science, his research has led to the identification of key Regulatory indicators that keep children healthy and safe while in out of home child care settings.

Dr Fiene is a Professor of Psychology (ret) (Penn State University) and founding director of the Capital Area Early Childhood Research and Training Institute. He is presently a Research Psychologist and Regulatory Prevention Scientist for the Research Institute for Key Indicators, an affiliated data laboratory with the Edna Bennett Pierce Prevention Research Center at the Pennsylvania State University.

Dr Fiene is regarded as a leading international researcher/scholar on human services licensing measurement and differential monitoring systems. His regulatory compliance law of diminishing returns has altered human services regulatory science and licensing measurement dramatically in thinking about how best to monitor and assess licensing rules and regulations through targeted and abbreviated inspections. The theory has also led to the issuing of human service licenses based on substantial regulatory compliance with all rules rather than full 100% regulatory compliance with all rules. This was a basic licensing and public policy paradigm shift which has impacted regulatory administration.

His research has led to the following developments: identification of herding behavior of two year olds, spatial acquisition device in young children & four states of space, national early care and education quality indicators, mathematical model (Contact Hours) for determining adult child ratio compliance, solution to the trilemma (quality, affordability, and accessibility) in child care delivery services, Stepping Stones to Caring for Our Children, NECPA: National Early Childhood Program Accreditation, online coaching as a targeted and individualized learning platform, validation framework for early childhood licensing systems and quality rating & improvement systems, an Early Childhood Program Quality Improvement & Indicator Model for better public policy decision making, Caring for Our Children Basics, Abbreviated Program Monitoring Inspections, Validation Framework for Licensing, Generic Key Indicator Rules, Regulatory Compliance Scoring Scale, RegalMetrics, and has led to the development of statistical techniques for dealing with highly skewed, non-parametric data distributions in human services licensing and regulatory systems, such as data dichotomization.

Dr Fiene had a long career in academia and governmental service. He was a research psychologist and regulatory scientist during his tenure with the Commonwealth of Pennsylvania's Office of Children, Youth, and Families and the Office of Licensing and Regulatory Administration where he was the research director for both offices. In academia he was a professor of psychology and human development at both the University of North Carolina and the Pennsylvania State University. At Penn State Harrisburg he was Department Head for both the psychology and human development programs during his tenure at the university.

At the national and international levels, Dr Fiene has been a senior research consultant to the National Association for Regulatory Administration, the Federal Office of Child Care, the Administration for Children and Families, and the Federal Department of Health and Human Services. His research has been disseminated to all 50 states and over 120 countries. In 2019, he was elected to the Early Childhood Exchange Leadership Initiative. He received the 2020 Distinguished Career Award from the Pennsylvania Association for the Education of Young Children. In 2023, his Key Indicator methodology for quality indicators received a Recognized Project of the Child Impact Initiative of the World Forum Foundation. Dr Fiene remains active in the regulatory prevention science and early childhood fields through the Edna Bennett Pierce Prevention Research Center at Penn State where he remains an affiliated faculty and a senior research psychologist. He has been a member of the American Psychological Society.