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The Intersection of Structural Quality and Process Quality in Building an Integrated Program Monitoring Systems Approach Using Artificial Intelligence

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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 utilizing artificial intelligence 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.

Key Words: Artificial Intelligence, Big Data, Structural Quality, Process Quality, Contact Hour Metric, Regulatory Compliance, Key Indicator Methodology, Integrated Program Monitoring

Introduction

The Child Care and Early Education (CCEE) field needs a means to monitor the key elements of structural and process quality in a unified framework. The theory of regulatory compliance has been suggested as this 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 measurement concepts (binary and ordinal measurement)

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. Another way of looking at this relationship is by combining the two pillars of regulatory compliance "Do no harm" and "Do good" into a unified single platform where they build upon each other.

This framework will be developed within this paper by fully describing the Contact Hour metric (Fiene & Stevens, 2021) and a newly created CCEE Quality Indicator tool (Fiene, 2024) 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, and for monitoring the spread of infectious diseases. 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 Methodology 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 as well as the Program Quality Indicators (PQI) that need to be measured in the Methodology section. Also, there is the Scoring Protocol to be used in determining the level of quality and 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 in the Results section. The Discussion section is provided in which a hypothetical example of two programs, one of high quality and one of low quality, are delineated demonstrating the scoring protocol in greater detail.

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 the following Methodology section related to the calculation of the Contact Hour metric). 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.

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 and provides the Program Quality Indicators (PQI) that are part of the CCEEHM App. This methodology provides 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 the Results Section which contains the opening screen to the App as well as the scoring protocol).

Methodology: Contact Hour (CH) Metric - The Structural Quality Component

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

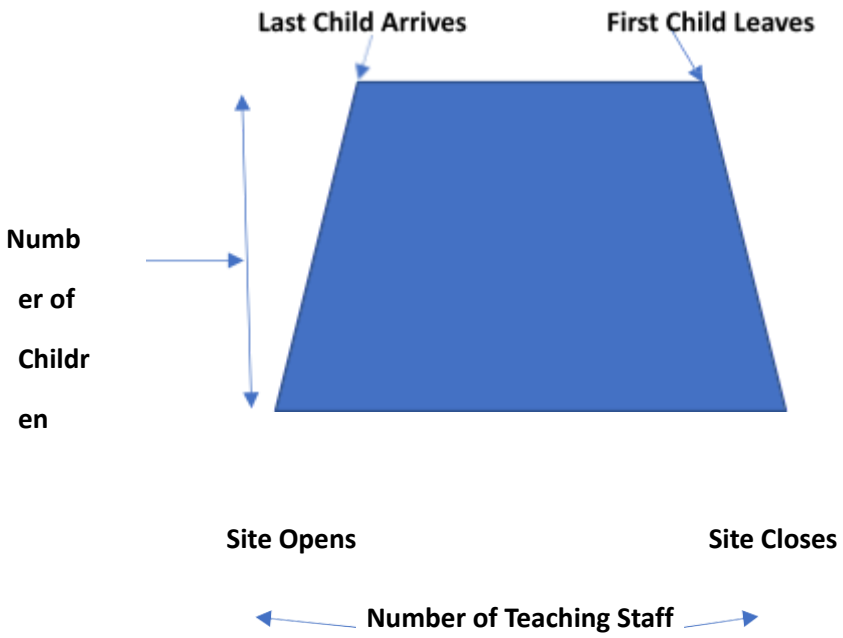
Group Size, Staff Child Ratio, Number of Children and Staff

<---------- 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.

Program Quality Indicators (PQI) - The Process Quality Component

This section provides the program quality indicators (PQI) which along with the previous contact hour metric 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 assessed.

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***

Results

This section provides the resultant scoring protocol that is generated from the above methods: Contact Hour Metric and the Program Quality Indicators. It is followed by the opening screen to the CCEEHM App.

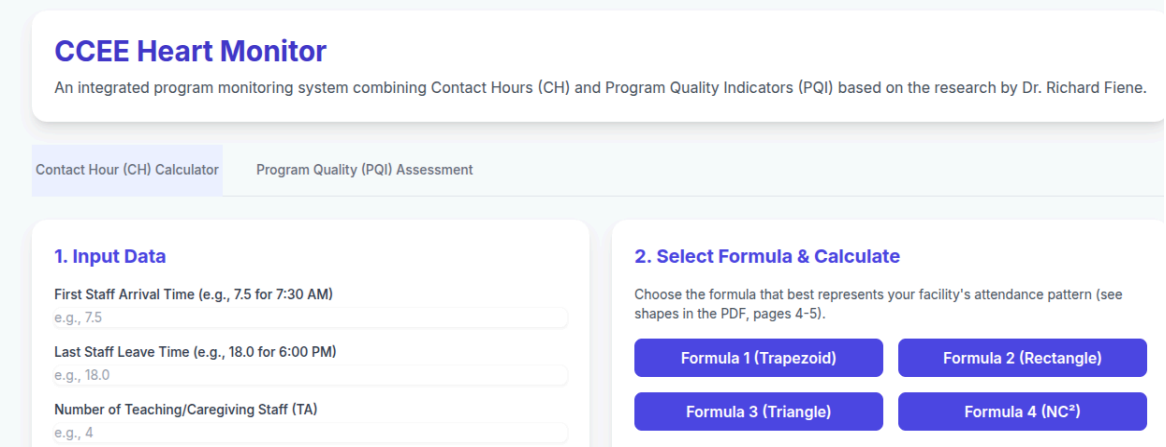
This scoring protocol (Table 2) which is generated from the Program Quality Indicators AI algorithms rank orders all programs on how well the classrooms measure up during the AI observations. The standardized scores are to the left while the actual classroom scores are to the right in the below table. The levels are specified as high quality, high-mid quality, mid-low quality, and low quality based upon the actual scores obtained.

Table 2: 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: _____

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

Figure 2



This 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.

The Discussion section contains a side by side comparison of two hypothetical programs, one of high quality and one of low quality. This case study gives the details of what the results would look like in utilizing the CCEEHM App.

Discussion

Comparative Analysis of Program Quality: A High vs. Low-Quality Child-Care Program Assessment Using the CCEEHM Framework

1. Introduction: A Tale of Two Programs

This report presents a detailed, side-by-side comparison, typical of a comprehensive program review, of two hypothetical early childhood programs—one high-quality and one low-quality—using the Child Care and Early Education Heart Monitor (CCEEHM) framework. The purpose of this analysis is to illustrate how the CCEEHM's integrated approach provides a comprehensive and objective measure of a program's overall effectiveness and its environment for children. By combining metrics for both structural and process quality, the framework moves beyond simple compliance checklists to create a holistic picture of the daily experiences that shape early development.

The CCEEHM framework is built on two core components, which will be used to structure this comparative analysis:

- **Structural Quality:** This foundational element is measured by the **Contact Hour (CH)** metric. It focuses on health, safety, and regulatory compliance elements and serves as a more effective and efficient metric for measuring compliance with standards like adult-child ratios and group sizes.
- **Process Quality:** This component is measured by the **Program Quality Indicators (PQI)**. It assesses the "heart" of quality—the daily interactions, curriculum, and learning environment that directly impact a child's developmental experience and well-being.

This report will begin by analyzing the foundational element of structural quality, demonstrating how the Contact Hour metric distinguishes a safe, compliant program from an unsafe, non-compliant one.

2. Structural Quality Analysis: The Contact Hour (CH) Metric

The Contact Hour (CH) metric is a strategically important measure of a program's foundational quality. It is not merely an administrative number but a direct assessment of regulatory compliance with adult-child ratios and group sizes. These standards are critical for ensuring child safety, providing adequate supervision, and creating an environment where meaningful interactions can occur. This section will demonstrate how the CH metric quantitatively differentiates a well-managed, compliant program from an overpopulated, non-compliant one.

To illustrate this, we will examine two hypothetical preschool classrooms: **Program A (High Quality)** and **Program B (Low Quality)**. Let's assume the required adult-child ratio for this age group is 1 educator for every 10 children (1:10).

CH Metric Question	Program A (High Quality) Response	Program B (Low Quality) Response
1. When does the facility open?	8:00 AM	8:00 AM
2. When does the facility close?	4:00 PM	4:00 PM
3. Number of teaching staff (TA)?	2	2
4. Number of children (NC)?	18	24
5. When does the last child arrive?	8:00 AM	8:00 AM
6. When does the first child leave?	4:00 PM	4:00 PM

For this analysis, we assume a scenario where full enrollment is present for the entire day to align with the reference model, using the formula CH = (NC x TO) / TA.

Contact Hour (CH) Calculation

- **Program A (High Quality)**
  - Number of Children (NC) = 18
  - Total Hours Open (TO) = 8
  - Total Teaching Staff (TA) = 2
  - **Calculation:** (18 * 8) / 2 = 72
  - **Final CH Value: 72**
- **Program B (Low Quality)**
  - Number of Children (NC) = 24
  - Total Hours Open (TO) = 8
  - Total Teaching Staff (TA) = 2
  - **Calculation:** (24 * 8) / 2 = 96
  - **Final CH Value: 96**

Analysis of Results

To determine compliance, we compare each program's calculated CH value against the maximum allowed CH value for their number of children at the required 1:10 ratio, as specified in the *Contact Hour (CH) Conversion Table*.

- **Program A (High Quality):** With 18 children and 2 staff, Program A maintains a 1:9 ratio, which is better than the required 1:10. According to the CH Conversion Table, for 18 children (NC) at a required 1:10 ratio, the maximum allowed CH value is **72**. Program A's calculated CH of **72** is equal to this compliance threshold.
    - **Conclusion:** Program A is **in compliance** with adult-child ratio and group size standards.
- **Program B (Low Quality):** With 24 children and only 2 staff, Program B operates at a 1:12 ratio, exceeding the required 1:10 limit. To determine the maximum allowed CH for a compliant program with 24 children at a 1:10 ratio, one must first calculate the required number of staff (24 children / 10 = 2.4, which requires 3 staff members). The compliant CH is therefore (24 children * 8 hours) / 3 staff = 64. This value of 64 represents the compliance threshold in the CH Conversion Table. Program B's calculated CH of **96** significantly exceeds this threshold.
    - **Conclusion:** Program B is **out of compliance**. The program is characterized as "overpopulated." Its density display would resemble the final example from the source text, a depiction that "clearly indicates a very high CH and non-compliance with ACR and GS."

This quantitative analysis reveals a critical distinction: Program A provides a safe and compliant structural foundation, whereas Program B does not. This structural failure creates an environment where high-quality interactions and individualized attention—the core components of process quality—are nearly impossible to achieve. We now turn to the qualitative assessment of the program environment to see how this foundation impacts the daily experiences of children.

3. Process Quality Analysis: The Program Quality Indicators (PQI)

The Program Quality Indicators (PQI) are the tools used to measure the "heart" of quality—the developmental and interactional experiences that define a child's day. While structural metrics ensure safety, the PQIs evaluate the richness of the curriculum, the warmth of interactions, and the overall supportiveness of the learning environment. This section will systematically compare Program A and Program B across all 10 PQIs to reveal the profound differences in their approaches to early care and education.

PQI 1: ECE III Educators (Credentialed Staff)

This indicator measures the percentage of teaching staff with higher-level credentials in early childhood education (ECE III), which is linked to higher quality interactions and curriculum implementation.

Program A (High Quality)	Program B (Low Quality)
A review of staff records shows that **8 out of 10** teaching staff (80%) are certified at the ECE III level. This high concentration of qualified educators suggests a strong commitment to professional knowledge and practice. **Score: 4** (76-100%)	A review of staff records shows that only **2 out of 10** teaching staff (20%) are certified at the ECE III level. This low percentage indicates a significant gap in staff qualifications and training. **Score: 1** (0-25%)

PQI 2: Stimulating and Dynamic Environment

This indicator uses an 11-point checklist to assess whether the classroom environment is child-centered, accessible, and reflective of children's interests and cultures.

Program A (High Quality)	Program B (Low Quality)
An observer marks 'Yes' for **10 of the 11** checklist items. Children freely access a variety of authentic materials, their work is displayed respectfully, and documentation of their learning projects is evident throughout the room. **Score: 4** (91%)	An observer marks 'Yes' for only **2 of the 11** checklist items. Materials are stored out of children's reach, the physical environment lacks evidence of child-authored work, and there are no family photos or sufficient print materials available. **Score: 1** (18%)

PQI 3: Developmentally Appropriate Curriculum

This indicator assesses whether the program uses individual child assessments to inform an emergent, developmentally appropriate curriculum.

Program A (High Quality)	Program B (Low Quality)
A review of 10 children's records reveals that **9 records (90%)** show a clear, documented link between developmental assessments and an individualized curriculum plan. All three key elements (emergent curriculum, co-learning,	A review of 10 children's records finds only **1 record (10%)** showing a link between assessment and curriculum. Most files lack developmental assessments or show a

and documented planning) are present. **Score: 4** (90%)	"canned," one-size-fits-all curriculum with no individualization. **Score: 1** (10%)

PQI 4: Opportunities for Staff and Families

This indicator measures the presence of policies and practices that foster strong, respectful, two-way communication and relationships between staff and families.

Program A (High Quality)	Program B (Low Quality)
The program has implemented all three examples of strong family communication. It provides materials in diverse formats, uses multiple modes of two-way communication (e.g., apps, regular calls), and demonstrates respectful engagement with family goals. **Score: 4** (100%)	The program has no formal policies for family communication. Communication is sporadic, one-way (e.g., occasional flyers), and does not actively engage families in a partnership. **Score: 1** (0%)

PQI 5: Information on Child's Progress

This indicator evaluates the formality and frequency with which programs share information about a child's developmental progress with their family.

Program A (High Quality)	Program B (Low Quality)
The program conducts formal parent-teacher conferences at least twice a year, provides detailed written progress reports, and ensures all communication is done in a culturally and linguistically appropriate manner for every family. **Score: 4**	The program offers neither regularly scheduled conferences nor written progress reports. Information is shared only if a problem arises. **Score: 0**

PQI 6: Educators Encourage Children to Communicate (Preschool)

This observational indicator assesses how effectively educators use materials and interactions to foster children's communication skills.

Program A (High Quality)	Program B (Low Quality)
During observation, educators skillfully balance listening and talking, leaving ample time for children to respond. They link children's spoken ideas to written language by	Observers note that no specific activities or materials are used to encourage communication. Staff-child talk consists primarily of one-way commands, and

writing down their stories and reading them back. **Score: 4**	children's attempts to converse are often ignored. **Score: 1**

PQI 7: Infant Toddler Observation

This indicator is for infant/toddler rooms. For this preschool-focused comparison, it is marked as N/A.

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

This observational indicator measures whether educators use daily conversations and experiences to build children's logical thinking and problem-solving abilities.

Program A (High Quality)	Program B (Low Quality)
Educators consistently use daily events to develop concepts. For example, they help children sequence steps in a cooking project and encourage them to reason through how to build a stable block tower. **Score: 4**	Educators do not talk with children about logical relationships like cause-and-effect or sequencing. Concepts are introduced via worksheets without concrete experiences, and staff simply provide answers rather than helping children think. **Score: 1**

PQI 9: Educators Listen Attentively

This indicator uses a series of timed observations to measure how consistently educators give children their undivided attention when they speak.

Program A (High Quality)	Program B (Low Quality)
Across 10 timed observations, educators consistently make eye contact, nod, and rephrase children's comments. Their average Likert score is **3.7**, demonstrating a consistent pattern of attentive listening. **Score: 4** (rounded up from 3.7)	Across 10 timed observations, educators rarely listen attentively, often looking away or continuing other tasks while a child is speaking. Their average Likert score is **1.3**. **Score: 1** (rounded down from 1.3)

PQI 10: Educators Speak Warmly

This indicator uses timed observations to measure the emotional tone of educator-child interactions, focusing on caring voice and body language.

Program A (High Quality)	Program B (Low Quality)
Observations reveal that educators consistently speak to children with a caring, respectful tone and warm body language. Their average Likert score is **3.8**, indicating a consistently positive emotional climate. **Score: 4** (rounded up from 3.8)	Observations show that educators rarely speak warmly. Their tone is often flat, harsh, or dismissive. Their average Likert score is **1.4**. **Score: 1** (rounded down from 1.4)

The detailed analysis of each indicator reveals a consistent pattern of high performance in Program A and deficient performance in Program B. The final section will synthesize these scores into an overall quality classification.

4. Final Scoring and Quality Classification

This section synthesizes the individual Program Quality Indicator (PQI) scores to generate a final, data-driven quality classification for each program. This culminating step demonstrates the CCEEHM's ability to provide a clear summary of overall process quality, transforming detailed observations into an actionable and easily understood rating.

The table below summarizes the scores for Program A and Program B across all applicable indicators.

Program Quality Indicator (PQI)	Program A: High Quality Score	Program B: Low Quality Score
PQI 1: ECE III Educators	4	1
PQI 2: Stimulating and Dynamic Environment	4	1
PQI 3: Developmentally Appropriate Curriculum	4	1
PQI 4: Opportunities for Staff and Families	4	1
PQI 5: Information on Child's Progress	4	0
PQI 6: Educators Encourage Communication	4	1

PQI 7: Infant Toddler Observation	N/A	N/A
PQI 8: Educators Use Language for Reasoning	4	1
PQI 9: Educators Listen Attentively	4	1
PQI 10: Educators Speak Warmly	4	1
Total Score (Preschool)	**36**	**8**

Analysis and Classification

Using the *Program Quality Indicators Artificial Intelligence (PQIAI) Scoring Protocol*, we can assign a final classification to each program based on its total score.

- **Program A (High Quality):** With a total score of **36**, Program A significantly exceeds the preschool threshold of 32 or higher.
    - **Classification: High Quality**
- **Program B (Low Quality):** With a total score of **8**, Program B falls well below the preschool threshold of 15 or less.
    - **Classification: Low Quality**

These classifications provide a definitive summary of the vast differences in process quality between the two programs, which will be discussed in the report's conclusion.

5. Conclusion: The Integrated Picture of Quality

The comparative analysis of Program A and Program B using the CCEEHM Scoring Protocol framework reveals a stark contrast that extends across every dimension of quality. The synthesis of both structural (Contact Hour) and process (Program Quality Indicators) metrics paints a complete and compelling picture of two vastly different environments for young children.

The key differentiators are clear. **Program A** not only demonstrates regulatory compliance and safety with a proper CH score but also excels in creating a rich, supportive, and developmentally appropriate environment, as evidenced by its high PQI score. It is a program where a safe foundation enables high-quality interactions, intentional teaching, and strong family partnerships to flourish.

In contrast, **Program B** is failing on all fronts. It is structurally non-compliant and unsafe, operating with an overpopulated classroom reflected in its high CH score. This foundational failure is mirrored in its process quality, where a low PQI score indicates an environment lacking

qualified staff, a meaningful curriculum, and the warm, responsive interactions that are essential for positive child development.

Ultimately, this analysis reinforces the value of the CCEEHM framework as an integrated system that moves the field beyond isolated compliance checks. While a simple licensing visit might check a program's pulse, the CCEEHM provides an EKG of its heart—measuring not just the structural factors that keep children safe, but the vital process quality interactions that make their hearts and minds grow.

Conclusion

The CCEEHM is an example of an integrated program monitoring system that puts structural and process quality on the same platform, something that has not been done in the early care and education field. This paper has delineated how to do this by starting with the innovative Contact Hour (CH) Metric and then combining that methodology with the Program Quality Indicators (PQI) generated utilizing the Key Indicator Methodology (KIM)(Fiene & Nixon, 1985) in which each CH is given a process quality score as described in the Results section. The PQIs are drawn from early care and education accreditation systems, professional development systems, and quality rating & improvement systems.

Integrated program monitoring systems build from differential monitoring systems approach which utilizes risk assessment and key indicator methods as their focal point. WIth integrated program monitoring systems program quality is infused into the rule making which enhances the structural level of quality by having a process quality element building upon the structural quality foundation. The CCEEHM has all these key elements built into its data analytical architecture based upon artificial intelligence and big data analysis.

Another way of looking at this framework is through the lens of cognitive computing in which the measurement strategy goes from nominal measurement which is predominant with structural quality to more of an ordinal measurement strategy with the introduction of process

quality elements. This leads to program quality indicators being measured at the ordinal level and ultimately leads to a Regulatory Compliance Scale (RCS) which has been proposed as an innovation for regulatory science measurement (Fiene, 2025b).

The CCEEHM could not be built without AI and big data analysis given the tremendous number of observations that need to be made in order to build and standardize the Scoring Protocol (Table 2) in the Results section. The number of observers it would take in order to build such a Scoring Protocol would have been prohibitively expensive. Also, the professional development and mentoring/coaching linkages to these AI Observations are extensive and can be used in programs to make improvements in their teaching staff.

Integrated program monitoring is a cost effective and efficient approach which protects children from harm while at the same time enhancing their daily experiences in the classroom. It attempts to provide the best of both worlds in "doing no harm" while "doing good", the twin pillars of an early care and education regulatory and quality framework (Fiene, 2025a). It also has the ability to inform professional development and technical assistance systems by building effective and efficient coaching/mentoring interventions based upon the results of the CCEEHM Scoring Protocol. This is a major enhancement in being able to link the program monitoring system to the professional development quality initiative.

The CCEEHM App is an innovation that should go a long way in improving the structural and process quality elements of early care and education programs in a cost effective and efficient manner. The Integrated Program Monitoring Systems Approach is the latest iteration in a long development of program monitoring systems from Uniform Program Monitoring to Instrument Based Program Monitoring to Differential Program Monitoring.

The computer generated hypothetical report highlighted in the Discussion section clearly demonstrates how the CCEEHM App will produce results that clearly differentiate between high

and low levels of quality in early care and education programs. It will be interesting to see how this new technology is used throughout the early care and education field in assessing both structural and process quality in children's classrooms.

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