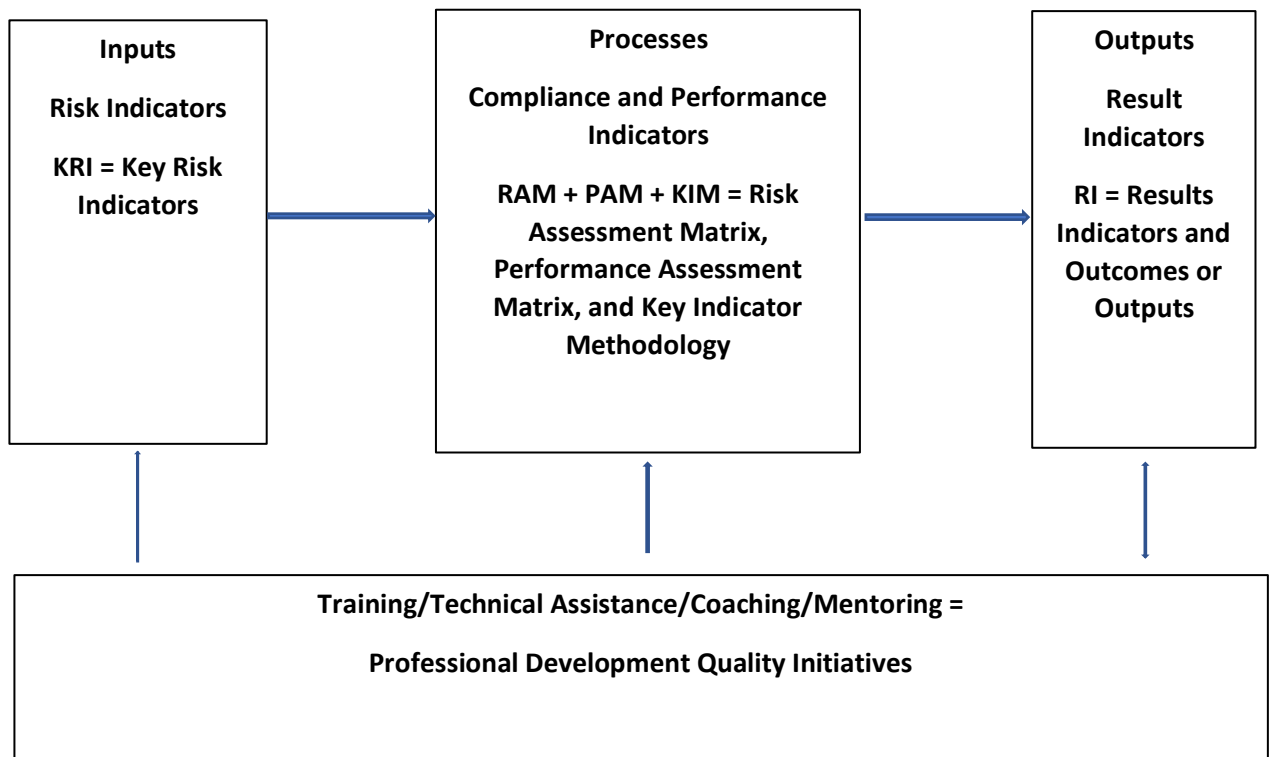


**ECPQIM5: Early Childhood Program Quality Improvement/Indicator Model Version 5 Technical
Research Note**

Richard Fiene, Ph.D.

April 2022

The purpose of this brief technical research note is to introduce the latest version of the Early Childhood Program Quality Improvement/Indicator Model (Version 5). This latest version takes into account the previous versions of the ECPQIMs and incorporates the latest monitoring research into the model.



The above figure depicts the relationships of risk indicators to compliance and performance indicators to outcome/result indicators. It also demonstrates the importance of quality initiatives such as professional development systems engaged in training, technical assistance, coaching, and mentoring of teachers. ECPQIM5 has taken all the best components from previous versions and has combined it in this present Version Five.

Another way of thinking about the relationships is to think in terms of a typical information system that involves inputs, processes, and outputs. ECPQIM2 was organized in this fashion while the other versions of ECPQIM were organized more according to the dictates of a logic model.

The best example of this version of the model is the Head Start Grantee Performance Management System (GPMS) that is under development and revision as we speak. There has been a great deal of interest in developing similar models in various state and Canadian Provinces. Head Start appears to have the lead in developing this state-of-the-art program monitoring system.

The other thing to notice with ECPQIM5 is the balance of compliance and performance indicators. This can occur with a deliberate effort to build in best practices or promising practices or through the use of other quality initiatives from Quality Rating and Improvement Systems, Accreditation Systems, or Professional Development Systems. And it is with the constant tie ins to professional development that really increases the strength of this latest version of ECPQIM5.

Also, the addition of Risk Indicators is an important design consideration which should have been introduced much earlier. It has been present in licensing and compliance but it is a critical element that will help to either make or break a program monitoring system. It helps to get programs off on a good start and not behind the eight ball.

As with any program monitoring system it is attempting to find the critical paths of those agencies that are successful and those that are struggling. It is through the use of validation studies to determine what the appropriate paths are statistically so that the proper balance of key indicators can be put in place to produce the greatest outputs/outcomes/results.

Richard Fiene, Ph.D., Research Psychologist, Research Institute for Key Indicators and the Edna Bennett Pierce Prevention Research Center, Penn State University. <https://www.prevention.psu.edu/people/fiene-richard>



Performance Assessment Matrix (PAM) Measuring Compliance/Performance

Prevalence -> Severity or Importance (below)	Often (+/-)	Sometimes (+/-)	Rarely (+/-)	Performance Measure Weights (below)
High	-9,0,+9	-8,0,+8	-7,0,+7	Top PMs
Mid	-6,0,+6	-3,0,+3	-4,0,+4	Mid PMs
Low	-3,0,+3	-2,0,+2	-1,0,+1	Low PMs

Provides the basic 3 x 3 Matrix used in many risk assessment matrices which assess potential risk as a combination of prevalence, how likely is something to happen and if it does happen what are the potential consequences or risks. What is different about the Performance Assessment Matrix is that it measures this combination of likelihood & severity in both a positive approach (importance/performance) and a negative (severity/compliance) approach. The negative approach has been described, the positive approach measures the 3 x 3 matrix in terms of importance.

The Performance Measures (PMs) are then placed along this severity or importance scale based upon their relative median weights as determined by a stakeholders ranking. The prevalence data will be drawn from the EAS measurement protocol for each PM.

Key Elements of GPMS:PAM

- **The GPMS:PAM is based upon Risk Assessment Matrices but it takes into account both importance as well as severity (+/-).**
- **The GPMS:PAM accounts for weighting of the PMs by ranking them from High to Low in importance based upon their Medians. Severity is measured by the inverse of Importance: the more it is not present, the worse it is.**
- **It builds off of the EAS protocol (Often, Sometimes, Rarely) in order to measure prevalence.**

There are three key elements to the Grantee Performance Measures System: Performance Assessment Matrix - (GPMS:PAM):

1) It builds upon the risk assessment matrices research that is very pervasive in the regulatory science field in which relative risk as measured by prevalence or scope of occurrence and the severity or actual risk to a group are measured together. The bottom line with risk assessment matrices is what risk will the event pose for a group and what is the likelihood that the event will occur. An event would be rated much higher if it poses severe risk and it is likely to happen than an event which has low risk and is unlikely to happen. And of course there are middle ground risk assessment scores where the risk may be high but the likelihood is extremely low.

2) What is different about the GPMS:PAM is that it measures not only "severity" but it also measures "importance". So two matrices need to be built to measure these two concepts. Severity is measured on a typical "compliance" risk assessment matrix, while importance will be measured on a "performance" matrix.

3) The PMs to be measured within this system have been rank ordered from high to low by a representative group of stakeholders involved in Head Start. There are 23 PMs in total with 9 PMs ranked high, 7 PMs ranked mid-range, and 7 PMs ranked at a low-range. Each of the PMs will be measured using the Evidence Assessment System

GPMS Scoring Algorithm (SA)

- $GPMS:SA = (PAM(HSPS(EAS:\Sigma PM1+PM23))) + (QRIS + ACC + PD) + (LIC)$
- **Where:**
- **PAM = -144 thru +144 (Core Score); HSPS = Standards; EAS = Evidence Assessment System (-1, 0, +1)**
- **$\Sigma PM1:PM23$ = the 23 PMs to determine compliance & performance**
- **QRIS = 0 thru 5 (Quality Initiative Add on)**
- **ACC = 0 or 5 (Quality Initiative Add on)**
- **PD = 0 thru 5 (Quality Initiative Add on)**
- **LIC = 1 for full license**
- **CLASS = Dependent Variable and should positively correlate with GPMS Score.**
- **Risk Indicators = Precursor to GPMS Score.**

This slide provides the overview to the GPMS scoring algorithm and the components that make up its composition. The GPMS scoring algorithm is made up of the 23 PMs along with potential other inputs from external systems, such as: Quality Rating and Improvement Systems (QRIS), Accreditation (ACC), and Professional Development (PD). All these systems are voluntary systems and are value-added to the overall scoring algorithm. A grantee will not be penalized if they do not participate in any of these other quality initiatives but if they do, they will have bonus points added to their overall score. Also, licensing data should be addressed.

Risk indicators are potential flags which are measured as precursors to an actual review. They may provide guidance in how a review will be done and what to target or focus upon.

GPMS Scoring Algorithm Sequencing

- **EAS: -1, 0, +1; Rarely = -1; Sometimes = 0; Often = +1.**
- **QM/EAS revised: 1, 2, 3, 4, 5 => (-2, -1, 0, +1, +2).**
- **QM revised scoring: None = -2, Rarely = -1, Sometimes = 0, Often/Always = +1, Exceeds = +2.**
- **QI: 1 = Deficiency (None/Rarely); 2 = Non-Compliance (Rarely); 3 = Issues (Sometimes); 4 = Compliance (Often); 5 = Exemplary (All).**
- **PM revised: 1, 2, 3, & 5 stay the same; 4 = 4a = Compliance, 4b = Compliance+.**
- **PAM: -9, -8 = PM1, 2; -7 = PM3; +7 = PM4a; +8 = PM4b; +9 = PM5.**

This slide provides the sequencing in moving from one measurement level to the next and provides two revisions in the scoring protocols in order to increase the variance and sensitivity of the scoring algorithm. This revision needs to especially occur at the Compliance level since the majority of grantees are scored at this level and skews the data dramatically based upon a historical review of data from 2020.

GPMS Scoring Algorithm Detail

- **EAS:** (-1, 0, +1) --> QM: (1, 2, 3, 4, 5) => (-2, -1, 0, +1, +2)
- **Standard:** Compliance or Non-Compliance (1/0)
- **PM:** 1 = Def, 2 = NC, 3 = Issues, 4 = Compliance, 5 = Exemplary
- **High PMs Score:** (-9, -8, -7, +7, +8, +9) x (9PMs) = ((-81) -- (+81))
- **Mid PMs Score:** (-6, -5, -4, +4, +5, +6) x (7PMs) = ((-42) -- (+42))
- **Low PMs Score:** (-3, -2, -1, +1, +2, +3) x (7PMs) = ((-21) -- (+21))
- **PAM Total Score Range (HighPMs+MidPMs+LowPMs):** ((-144) -- (+144))
- **Final Score:** A=144-94; B= 93-43; C=42-(-42); D=(-43)-(-93); F=(-94)-(-144)
- **OtherQI:** Accreditation(5); QRIS(1-5); Professional Development(1-5)

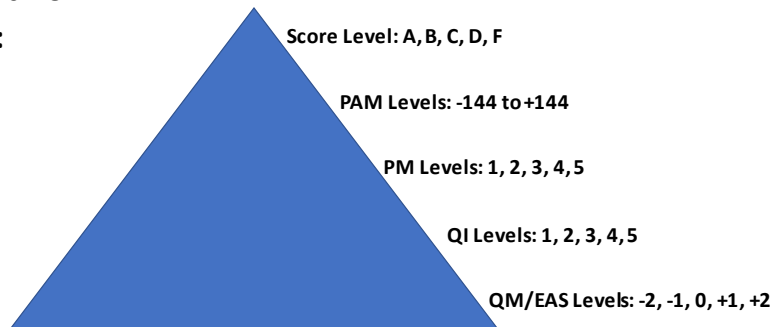
This slide provides the GPMS scoring algorithm details on how each level of measurement will be assessed.

It starts with the EAS protocol, where it is being proposed that the present scoring protocol be expanded from a 3 point scale to a 5 point scale. The three point scale has the following basic characteristics: "rarely, sometimes, often" are used to measure each dimension within a standard/PM/Quality Indicator. It is being suggested that the "rarely, sometimes, and often" scale be transposed to a more mathematical scale as such: -1, 0, +1. Once this is done, it is suggested that this mathematical scale be expanded to the following when scoring each standard/PM: -2, -1, 0, +1, +2; where -2 = None and +2 = All. -1, 0, +1 stay the same.

QI = Quality Initiatives such as: accreditation, quality rating and improvement systems, and professional development systems are potential Add Ons to the Scoring Algorithm.

PAM Measurement Hierarchy

- **Measurement from Bottom to Top:**



This pyramid provides a graphical display of how the various measurement levels relate to each other in a logical fashion.

The EAS Level is the basic, beginning level where all measurement begins. It is the most detailed and granular level, and has the most data points.

From the EAS level, these data can be aggregated upwards to the standard, PM, & Quality Indicator levels. There are more standards than PMs but there will be mapping that can occur.

From the PM level, aggregation occurs to the PAM level where all the PMs are added together to come up with a total score with a range of +144 thru to -144.

This PAM score can then be transposed to a specific score level: A, B, C, D, F.

Performance Assessment Matrix: Compliance

Prevalence -> Severity Weights (below)	Often	Sometimes	Rarely
High	-9	-8	-7
Mid	-6	-5	-4
Low	-3	-2	-1

This matrix depicts the relationship between prevalence and severity which is typical in risk assessment matrices.

Performance Assessment Matrix: Importance

Prevalence -> Importance Weights (below)	Often	Sometimes	Rarely
High	+9	+8	+7
Mid	+6	+5	+4
Low	+3	+2	+1

This matrix builds off of the risk assessment matrix as depicted in the previous slide where prevalence cells stay the same but the weights are more positive than negative as in the previous slide.

A higher score (+9) is a good result where in the previous slide a higher score (-9) is not a good result. This matrix needs to be used in conjunction with the previous slide in order to determine the overall PAM Score.

This matrix clearly builds upon the risk assessment matrix research but expands it to account for both positive (+) and negative (-) results. In this matrix, a high importance rating = a high performance rating.

GPMS Scoring Algorithm Levels

Measurement Level	Deficient	Non-Compliance	Compliant with Issues	Compliant	Exemplary
EAS	None	Rarely	Sometimes	Often	All
QM	-2	-1	0	+1	+2
	1	2	3	4	5
QI/PM	1	2	3	4	5
PAM	-9	-8	-7	+7/+8	+9
Final Score	F (-144) - (-94)	D (-93) - (-43)	C (-42) - (+42)	B (+43) - (+93)	A (+94) - (+144)

This graphic depicts the relationship amongst the measurement levels demonstrating how the measurement proceeds from one level to the next level. This matrix provides the detail to the pyramid that is depicted on Slide #7.

The final score measurement level has a preponderance of scores in the central "C" score level because of the supposition that the scaling will be closer to normally distributed given the revised EAS and PAM scoring. However, only with additional data collection and testing will we be able to improve upon this supposition.

Performance Assessment Matrix (PAM) Simulation Examples

Simulation	PM Rating = 1 (-9) Deficient	PM Rating = 2 (-8) Non-Compliance	PM Rating = 3 (-7) Issues Compliant	PM Rating = 4 (0 or +7) Full Compliance	PM Rating = 5 (+8/+9) Exemplary	Total PAM Score ((-81) -- (+81)) or 9-45 Raw Score
Compliance = +7	0	0	0	9	0	+63
Compliance = 0	0	0	0	9	0	0
Raw Scores	0	0	0	9	0	36

This slide and table provides the results of three simulations where certain assumptions were made from a scoring protocol:

The first, bottom row, Raw Scores, contains no weights or prevalence scoring as depicted in the PAM. It is a sum of the PM x the number of PMs. So in the example provided, there were 9 PMs assessed with all of them rated at a "4" level = 36.

The second, middle row, using the PAM but the "Full Compliance Rating" = 0 and has no specific weight/prevalence result. Again, 9 PMs were rated but in this case a "Full Compliance Rating" = 0. Nine PMs x "0" = "0".

The last, top row, uses the PAM but with "Full Compliance Rating" = +7. In this case, the (9PMs) x (+7) = +63. This last simulation provides the greatest variance in the data covering 85% of the full PAM score range. This is significantly better than the other two simulations where only about 50% of the score ranges.

Performance Assessment Matrix (PAM) Simulation for High PMs (9PMs = High)

Grantee Number in Data Base	PM Rating = 1 (-9) Deficient	PM Rating = 2 (-8) Non-Compliance	PM Rating = 3 (-7) Issues Compliant	PM Rating = 4 (+7) Full Compliance	PM Rating = 5 (+8/+9) Exemplary	Total PAM Score ((-81) – (+81)) (A - F)
001	0	0	0	9	0	+63 (B)
011	0	1	4	4	0	-8 (C)
020	3	5	1	0	0	-74 (D-)
051	0	3	5	1	0	-52 (D)

Using the simulation with Full Compliance = +7 from the previous slide #11, four examples are provided to demonstrate how the scoring would actually play out with PAM and final scores (A thru F) that are provided to the grantees.