Learner Profile Analysis: Dimensionality Reduction and Clustering
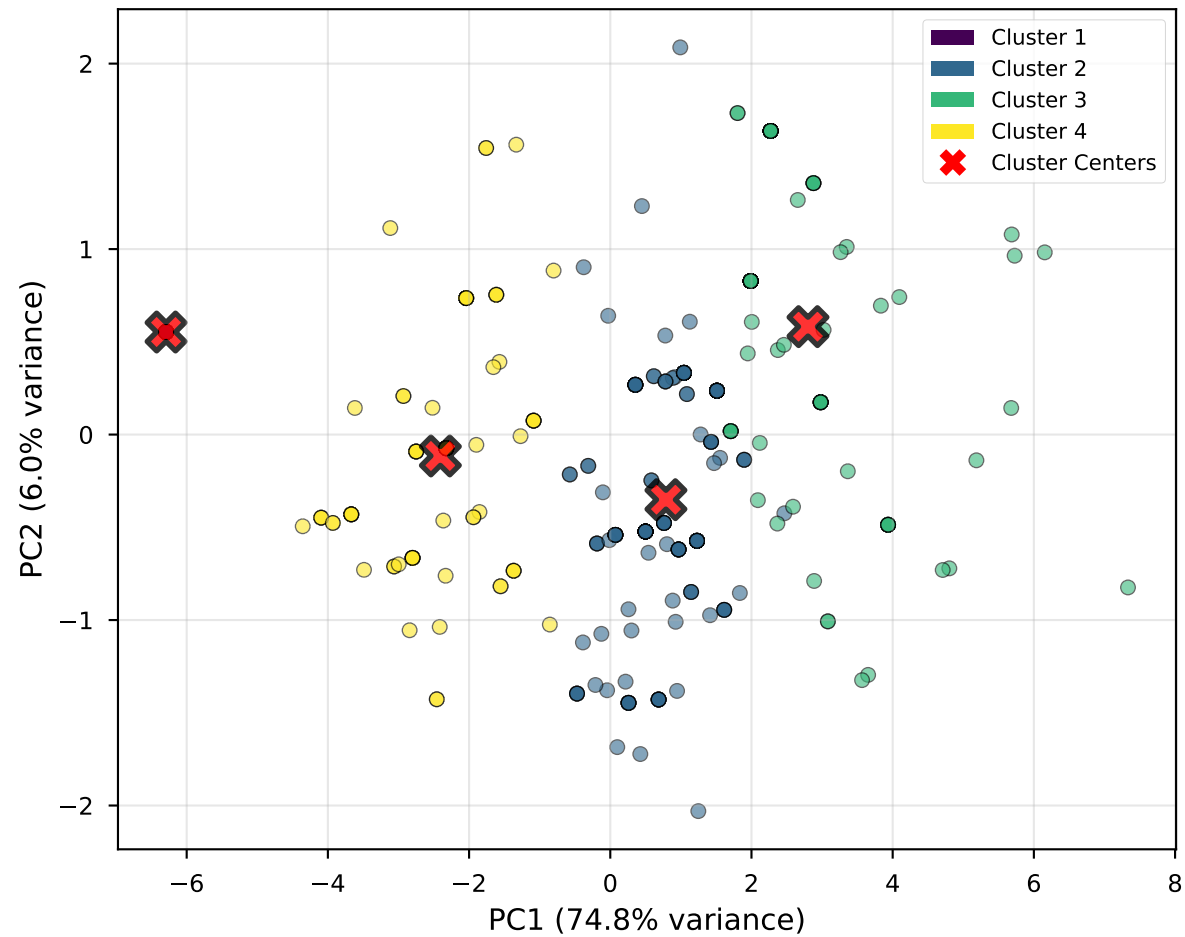
PCA: Learner Profiles in 2D Space
(K-means clusters shown)

Legend:
- Cluster 1
- Cluster 2
- Cluster 3
- Cluster 4
- ✖ Cluster Centers

X-axis: PC1 (74.8% variance)
Y-axis: PC2 (6.0% variance)

Mean Metric Scores by Cluster

Metric	C1 (n=35)	C2 (n=184)	C3 (n=93)	C4 (n=77)
cognitive_engagement	1.00	2.99	3.08	2.01
query_sophistication	1.00	2.45	3.00	2.00
self_directedness	1.00	3.01	3.20	2.14
iterative_refinement	1.00	2.01	2.44	1.21
learning_orientation	1.00	2.72	3.04	1.88
agency_ownership	1.00	3.01	3.22	2.12
linguistic_production	1.00	2.25	3.24	1.35
memory_retention	1.00	2.02	3.01	1.66
metacognitive_awareness	1.00	2.01	2.45	1.81
overall_learning_quality	1.00	2.71	3.08	1.88

Mean Score scale: 1.0 to 5.0