

# How Do Students Self-assess: Comparing Student Self-assessment to Faculty and Resident Evaluations in Clerkship Rotations

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## Research Article

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How do Students Self-Assess: Comparing Student Self-Assessment to Faculty and Resident Evaluations in Clerkship Rotations

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## Declarations

**Ethics Approval and consent to participate:** The Wayne State University Division of Research Institutional Review Board (IRB) reviewed a description of the project and found it did not meet the definition of Human Participant Research subject to the IRB oversight and therefore IRB review was not required. All methods were carried out in accordance with relevant guidelines and regulations and informed consent was obtained from all subjects.

**Consent for publication:** N/A

**Availability of data and materials:** Data was collected and interpreted by WSUSOM. The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request by contacting [agaynier@med.wayne.edu](mailto:agaynier@med.wayne.edu).

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## ***Abstract***

Background: The literature suggests that medical student self-assessment often does not match the evaluations from faculty/residents but can improve over time and with practice.

Additionally, there is literature that suggests women underestimate their abilities compared with their male counterparts.

Results: Medical students at Wayne State University School of Medicine (WSUSOM) completed self-assessments using the same 11 competencies that they are evaluated by faculty/residents (evaluators). All students completed self-assessments. Overall medical students significantly overestimated their performance in all competencies compared with evaluators. Women assessed their ability underestimated their performance in 33% of competencies.

Conclusion: Improving self-assessment may improve students' abilities to become self-regulated life-long learners.

## ***Introduction***

The world of medicine is ever changing. Physicians must be life-long learners, upholding service, professionalism, and competency long after their formal medical education ends. Physicians must be able to diagnose their own learning needs, pursue education and development to close identified gaps. To do this successfully medical doctors must have the ability self-regulate(1). Self-regulated learning (SRL) has been defined classically as: “self-generated thoughts, feelings and actions that are planned and cyclically adapted to the attainment of personal goals (2).” The ability to correctly self-regulate depends on the ability to self-assess and accurately identify areas of improvement. Self-assessment training has become a part of medical education, continuing throughout undergraduate and graduate medical education. There are currently mixed findings on medical students’ ability to self-assess in clinical rotations (3-7).

During clinical clerkships medical students apply knowledge and skills learned during the pre-clinical curriculum while caring for patients in supervised settings. Students have similar duty hours to residents, students must find time for learning the material necessary to pass shelf exams, develop basic clinical competence, and complete assignments, while maintaining health and wellness. Medical students not only improve clinical skills but develop the identity and behaviors of a physician. With limited time before residency, medical students face challenges

being self-regulated learners and self-assessing their knowledge and skills to identify gaps and areas for improvement preparing them to become self-directed life-long learners. (3)

According to Hochberg students' self-assessment and preceptor evaluations agreed only 38% of the time. Wooliscroft found that in the internal medicine (IM) clerkship correlations between students' final self-assessments and the ratings by faculty and residents were generally weak; consistent with previous research (4). The surgery clerkship at the University of Utah School of Medicine found that medical students can accurately identify strengths and weaknesses through self-assessment. (5) Weiss demonstrated that for third year medical students on the obstetrics and gynecology (Ob/Gyn) clerkship, completing an end-of-clerkship self-assessment improved their ability to assess their performance. Self-evaluation, resulted improvement in knowledge and an increase of ability to assess technical and written/verbal skills (6) (7). There is some literature to suggest that women in particular underestimate their performance. Female surgeons, pediatric interns, and female medical students underestimated their abilities compared to their male counterparts on a variety of assessments (4, 8-12). Research suggests that student self-assessment does not agree with the evaluations from faculty and residents (2-7).

The previous literature is primarily confined to comparisons of self-assessments to faculty and or resident evaluations on single clerkships. The purpose of this study was to address a gap in the literature through a large, single institution study across multiple clerkships by studying students during each of their six clerkships.

## ***Methods***

Wayne State University School of Medicine (WSUSOM) located in Detroit, MI has prepared students to be health care leaders and advocates who go on to change the world since

1868. WSUSOM has a class of around 300 students, which is one of the largest single campus medical schools. A problem was identified in student's perceptions of their performance through discussions with faculty and clerkship directors at formal, and informal meetings. A consensus stated that students overestimated their performance. Using Kern's six step approach to curriculum development (13); a proposal for end of clerkship self-assessment was adopted by the Curriculum Committee. We sought to find the relationship between student self-assessment and faculty/resident evaluations across multiple clerkships and to determine if self-assessments improved over time, and to identify gender differences in self-assessment and to give students an opportunity to reflect and plan improvements. We implemented a self-assessment that contains the same 11 competencies (history taking, performing physical/mental exam, ability to synthesize, ability to formulate a therapeutic plan, oral presentations, written documentation, medical knowledge, self-directed learning, professionalism and relationships with team, professionalism ethics with patients, and professional behavior) which faculty/residents use to evaluate students including a final question, about overall progress using the "RIME" framework "Reporter, Interpreter, Manager, Educator, a framework with a developmental approach that measures performance. The RIME scale has levels of skills to show their level of professional competencies (9)." RIME was added to assess without affecting grading, to show students where they are in their clinical cognitive development. Students were asked to answer the following questions, "list three things you learned about yourself" and "suggestions to help improve performance in clerkship rotations as to development as a physician."

Completing self-assessment was mandatory for students in every clerkship. This was completed on E-Value, our vehicle for gathering electronic evaluations. All self-assessments were completed within 48 hours of the end of the student's clerkship, before students received



their clerkship assessments and grades. Each student completed a self-assessment seven times over the year corresponding with the seven clerkships in our curriculum. The mixed methods self-assessment data was collected by WSUSOM for the 2017-2018 academic year with a total of 299 students in each of the core clerkships (IM, Family Medicine, Neurology, Psychology, Emergency Medicine, Ob/Gyn, and Pediatrics) to determine how students self-assess compared with faculty and residents' formal end-of-clerkship assessments across clerkships. Data was de-identified to investigators. Combining clerkships, student self-assessments were averaged by competency. Faculty and resident evaluations were combined and similarly averaged. Standard deviations were calculated. The average student self-assessment, faculty/resident evaluation, and gender self-assessment competencies by clerkship was then calculated to give an overall assessment by clerkship. Using a standard t-test we were able to calculate the differences in the data to find significance. We also compared the IM clerkship over the academic year to see if student self-assessment improved over time.

We also completed a qualitative review of students' responses on the IM clerkship, to the questions, "list three things you learned about yourself" and "suggestions to help improve performance in clerkship rotations as to development as a physician." Three researchers coded the data, including a doctoral student in the college of education and fourth year medical students, all from WSUSOM. Researchers reviewed 50 responses from each of the questions and identified codes. Separate codes were found for each individual question. The group worked together to develop a code book, differences in codes were resolved by consensus. The code book was then used to review all 299 responses in each question, and themes were developed.

A mixed methods approach was chosen to capture the quantitative and qualitative data to better understand our students' perceptions related to their performance. The IRB reviewed a description of the project and found it did not meet the definition of Human Participant Research subject to IRB oversight and therefore IRB review was not required. All methods were carried out in accordance with relevant guidelines and regulations and informed consent was obtained from all subjects.

## ***Results***

During academic year 2017-2018, 299 students completed at least one clerkship and 284 completed all clerkships. Of students completing clerkships, 100% completed their self-assessments within 48 hours of clerkship completion. When averaged by competency, student self-assessments were significantly higher than evaluators (faculty and residents) in all 11 competencies (100%), with the greatest differences seen in the areas of professionalism. Students also over assessed their performance as measured by RIME (Table 1).

Table 1

<b>Combined clerkships: Faculty/Resident Evaluation scores vs. Student Self-Assessment scores</b>			
	<b>EVALUATOR</b>	<b>STUDENT</b>	
	Mean	Mean	P value
<b>History Taking</b>	4.1	4.4	0.0001
<b>Performing Physical/Mental</b>	4.0	4.2	0.0001
<b>Ability to Synthesize</b>	4.0	4.2	0.0001
<b>Ability to Formulate</b>	3.9	4.0	0.0459
<b>Oral Presentations</b>	4.1	4.3	0.0001
<b>Written Documentation</b>	4.1	4.3	0.0001
<b>Medical Knowledge</b>	4.0	4.2	0.0001
<b>Self-Directed Learning</b>	4.2	4.5	0.0001

<b>Professionalism and Relationships with Team</b>	4.4	4.8	0.0001
<b>Professionalism, Ethics with Patients</b>	4.4	4.8	0.0001
<b>Professional Behavior</b>	4.4	4.7	0.0001
<b>Reporter, Interpreter, Manager, Educator (RIME)</b>	3.9	4.2	0.0001
<b>Count</b>	1343.0	<b>299</b>	

In Neurology, Pediatrics, Surgery, and Psychiatry clerkships students' self-assessments were significantly higher in all 11 (100%) of the competencies as well as RIME. In Ob/Gyn and IM students significantly overestimated their abilities in 6/11 (55%) competencies, including three professionalism competencies (Table 2).

Table 2

<b>Internal Medicine Clerkship Student Self-Assessment vs Faculty/Resident Evaluation</b>					
<b>Competency</b>	<b>Faculty</b>		<b>Student</b>		<b>P value</b>
	<b>Means</b>	<b>Standard Deviation</b>	<b>Means</b>	<b>Standard Deviation</b>	
<b>History Taking</b>	4.2	0.8	4.4	0.6	0.0002
<b>Performing Physical/Mental</b>	4.1	0.8	4.1	0.7	1
<b>Ability to Synthesize</b>	4.1	0.8	4.2	0.7	0.0778
<b>Ability to Formulate</b>	4	0.8	4	0.7	1
<b>Oral Presentations</b>	4.2	0.8	4.3	0.7	0.0778
<b>Written Documentation</b>	4.2	0.8	4.4	0.7	0.0004
<b>Medical Knowledge</b>	4.1	0.8	4.1	0.7	1
<b>Self-Directed Learning</b>	4.3	0.8	4.5	0.7	0.0004
<b>Professionalism and Relationships</b>	4.6	0.7	4.8	0.4	0.0001
<b>Professionalism, Ethics</b>	4.6	0.7	4.8	0.4	0.0001
<b>Professional Behavior</b>	4.5	0.7	4.7	0.5	0.0001
<b>RIME Evaluation</b>	3.9	0.8	4.1	0.7	0.0004

<b>Count</b>	<b>1956</b>	<b>1956</b>	<b>288</b>	<b>288</b>	
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Family Medicine (FM) students significantly overestimated their abilities in 5/11 (45%) competencies. Students also significantly overestimated performance in all professionalism competencies (Table 3). In Emergency Medicine (EM), taken as part of the student's fourth year of medical school, students significantly overestimated their abilities in 7/11 (64%) competencies, including all of those in professionalism. Students overestimated themselves in all clerkships in all three of the professionalism categories and in history taking (Table 1). RIME was overestimated in seven of eight (88%) clerkships with FM being the one exception.

Table 3

<b>Family Medicine Clerkship Student Self-Assessment vs Faculty/Resident Evaluation</b>					
<b>Competency</b>	<b>Faculty</b>		<b>Student</b>		<b>P value</b>
	<b>Means</b>	<b>Standard Deviation</b>	<b>Means</b>	<b>Standard Deviation</b>	
<b>History Taking</b>	4.2	0.8	4.5	0.6	<.0001
<b>Performing Physical/Mental</b>	4.1	0.8	4.2	0.7	0.0778
<b>Ability to Synthesize</b>	4.1	0.8	4.2	0.7	0.0778
<b>Ability to Formulate</b>	4	0.8	4	0.7	1
<b>Oral Presentations</b>	4.2	0.9	4.2	0.7	1
<b>Written Documentation</b>	4.2	0.8	4.3	0.8	0.0913
<b>Medical Knowledge</b>	4.1	0.8	4.2	0.7	0.0778
<b>Self-Directed Learning</b>	4.3	0.8	4.5	0.7	0.0004
<b>Professionalism and Relationships</b>	4.5	0.8	4.8	0.5	<.0001
<b>Professionalism, Ethics</b>	4.5	0.8	4.8	0.5	<.0001
<b>Professional Behavior</b>	4.5	0.8	4.8	0.6	<.0001
<b>RIME Evaluation</b>	4.1	0.8	4.1	0.7	1
<b>Count</b>	<b>514</b>	<b>514</b>	<b>284</b>	<b>284</b>	

Data was also compared by gender. Women rated their skills significantly lower than men in two of 11 (18%) of the competencies, and in RIME compared with their male counterparts. These competencies were Ability to Synthesize, Medical Knowledge, and RIME (Table 4).

Table 4

<b>Student Self-Assessment Comparison by Gender</b>			
	<b>Women</b>	<b>Men</b>	<b>P value</b>
<b>History Taking</b>	4.42	4.43	0.8946
<b>Performing Physical/Mental</b>	4.14	4.24	0.2249
<b>Ability to Synthesize</b>	4.10	4.29	0.0216
<b>Ability to Formulate</b>	3.90	4.07	0.0595
<b>Oral Presentations</b>	4.23	4.29	0.4739
<b>Written Documentation</b>	4.28	4.32	0.6476
<b>Medical Knowledge</b>	4.08	4.25	0.0449
<b>Self-Directed Learning</b>	4.49	4.53	0.6074
<b>Professionalism and Relationships with Team</b>	4.81	4.78	0.59
<b>Professionalism, Ethics with Patients</b>	4.82	4.79	0.59
<b>Professional Behavior</b>	4.74	4.72	0.7577
<b>Reporter, Interpreter, Manager, Educator (RIME)</b>	4.05	4.25	0.015
<b>Count</b>	119.	180.0	

Because of a change in WSUSOM's online evaluation systems, block by block student self-assessment academic year data was only available for the IM Clerkship, thus we compared student self-assessment on the IM Clerkship throughout the academic year (Table 5). Over the course of the year, ability to self-assess worsened. Students over assessed their performance by a higher margin over time as the year went on, and all increased significantly from Block 6 compared to Block 1 ( $p < .0001$ ). Block 1 being the beginning of the third year of medical school and Block 6 the end of the third year, each block lasting eight weeks. In Block 5, student

overestimation was the highest, and then decreased slightly in Block 6 however, there was no significant difference between Block 5 and Block 6.

Table 5

Internal Medicine Clerkship Student Self-Assessment Scores by Block							
	Block 1	Block 2	Block 3	Block 4	Block 5	Block 6	FACULTY AVERAGE
Self-Assessment - History Taking	4.02	4.07	4.22	4.26	4.58	4.60	4.16
Self-Assessment - Performing Physical/Mental Status Exam	3.67	3.65	4.00	4.02	4.27	4.26	4.05
Self-Assessment - Ability to Synthesize Data into Assessment	4.00	3.80	3.94	4.13	4.38	4.36	4.04
Self-Assessment - Ability to Formulate Therapeutic Plan	3.64	3.50	3.67	3.87	4.15	4.13	3.89
Self-Assessment - Oral Presentations	4.00	3.93	4.06	4.26	4.56	4.38	4.18
Self-Assessment - Written Documentation	3.96	3.93	4.17	4.22	4.48	4.49	4.08
Self-Assessment - Medical Knowledge	3.87	3.70	3.89	4.09	4.17	4.30	4.13
Self-Assessment - Self-Directed Learning	4.18	4.26	4.39	4.50	4.60	4.51	4.29
Self-Assessment - Professionalism and Relationships with Team Members	4.62	4.61	4.72	4.59	4.88	4.77	4.54
Self-Assessment - Professionalism, Ethics and Interpersonal Relationships with Patients	4.67	4.63	4.75	4.65	4.85	4.81	4.56
Self-Assessment - Professional Behavior, Demeanor, and Work Ethic	4.47	4.48	4.58	4.59	4.81	4.81	4.50

Self-Assessment - RIME Evaluation: Please assess this student's overall performance							
	3.78	3.72	4.00	3.96	4.38	4.32	3.84
Overall Average	4.07	4.02	4.20	4.26	4.51	4.48	4.19

Several themes emerged during qualitative analysis; however, the overarching theme was that students learned about themselves through patient interaction (Figure 1). Students' responses centered around, what they enjoyed and areas of growth. Students recognized growth in clinical competencies, some identifying growth through the clerkship and since the start of the third year and others identifying areas of perceived strength. Some responses included:

“I learned that I really enjoy IM, problem solving, and learning about diseases”

“I am able to effectively communicate with patients and researching to understand their needs. I am capable of empathizing with patients to make sure they are provided with the best of care.”

Students also expressed confidence in their clinical competencies, which speak to the quantitative data and their over assessment of skills.

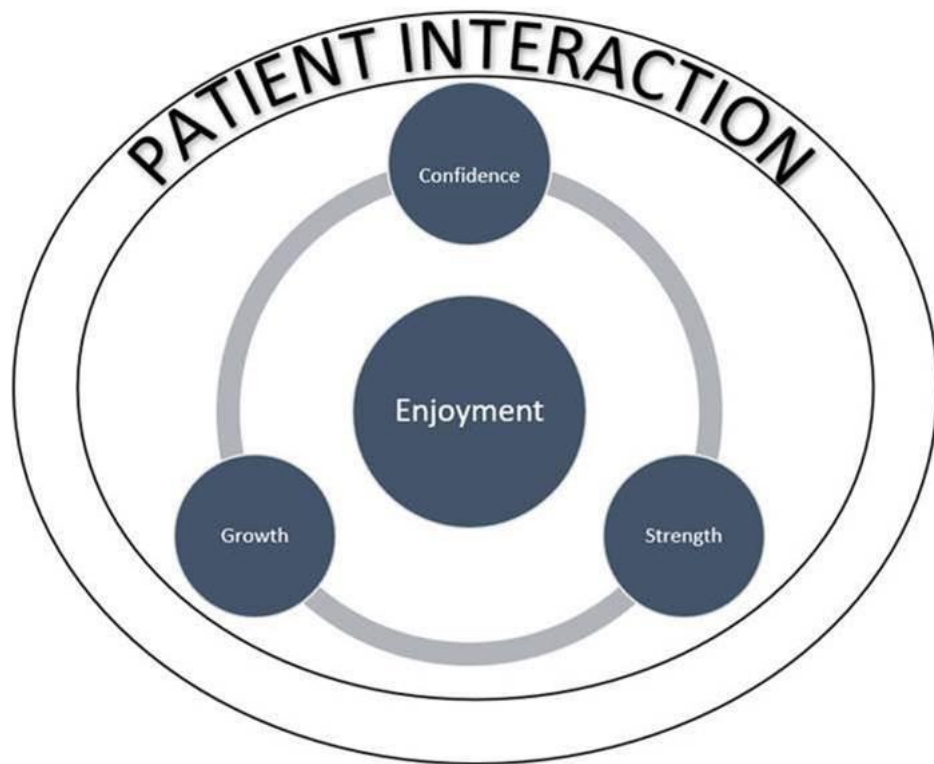
“I am a great history taker, I am able to establish rapport with all patients, and I am able to adequately come up with a treatment plan.”

In “Suggestions to help improve performance in clerkship rotations as related to development as a physician” The intent of this question was to focus on self-assessment, yet responses fell into two main themes; “recommendations for clerkship improvement” and “personal plans for self-improvement.” Students provided recommendations to improve the clerkship, predominately related to scheduling. Personal plans for self-improvement focused on improvement in the clinical competencies, the need to “read more”, and the need to be more proactive by speaking up and seeking feedback during the clerkship.

“Read more, ask more, do more.”

“I need to speak up and be more obvious about the work that I am putting in. Residents and attendings only interact with me briefly, I need to show that I have read/researched.”

Figure 1



## ***Discussion***

Medical students overestimated their performance on every clerkship compared with evaluators. IM, OB/Gyn, and FM were the clerkships with the least overestimations by students. Overestimation of performance by students continued to be present even during the fourth year of medicine school on the EM rotation.

The reason for differences by clerkship is not clear. Unlike many clerkships, students on the FM clerkship generally work with one faculty for the entire rotation allowing faculty to



provide feedback potentially allowing students to better calibrate their performance compared with clerkship competencies.

Interestingly, in both IM and FM, competencies requiring greater technical skill such as the physical examination or higher order thinking such as ability to formulate a therapeutic plan were not the competencies that were overestimated by students. Rather, students overestimated their performance in self-directed learning and in all professionalism competencies. These are areas where students have control over their performance.

Similar to previous literature (4, 8-12, 14), we also saw gender differences in student self-assessment. These were not only in the competencies but also in RIME. Although more than half of medical students are now women in the United States, in our study women still underestimated their skills compared to men. This may reflect the imposter syndrome, as women display more than twice the percentage of men in a recent study of medical students (15) (16). Alternatively, women may be better at self-assessment.

Providing feedback to students who believe their performance is superior to raters makes giving feedback challenging. This is particularly difficult with lower performing and less experienced students who tend to overestimate their achievements (17). Students recognize that feedback is important to learning, and a key to this is seeking timely, personalized, and better feedback (18). Students stated the need to be proactive seeking feedback during the clerkship. This lack of quality feedback may reinforce inflated student self-assessments.

In preparation for internship and residency, self-assessment sets the stage for success in the “Core Entrustable Professional Activities (EPAs) that medical students should be able to

perform upon entering residency, regardless of their future career specialty (19).” The ability to self-assess on the EPAs is crucial for success. The key to self-assessment is the accuracy in which one can assess oneself and the ability to use self-directed learning to improve on the areas of weakness. We believe by incorporating self-assessment we are preparing the students for success in the future (1-2).

Previous research has only addressed self-assessments on single clerkships. Our study adds to the literature by comparing and contrasting self-assessment across clerkships throughout the academic year. With the data from students on all clerkships we saw that the evaluations were not aligned with those of their evaluators and worsened over time until their final clerkship where self-assessments declined perhaps reflecting a better understanding of the competencies as they enter their final year of medical. Self-regulated learning depends on the ability to accurately self-assess. Our study suggests students’ self-assessments does not align with evaluations, we believe that more work is needed to teach medical students self-assessment skills.

## ***Limitations***

This study was performed at a single institution. Despite the large number of evaluations our findings may not be generalizable to other medical schools. A combination of evaluations is used for grading at our SOM without distinguishing whether the evaluator is a faculty or resident. This did not allow for us to compare student self-assessment to only faculty or only residents. We measured self-assessment on required clerkships but were unable to analyze self-assessment on the fourth year acting internship (sub-internship) as that rotation used a paper-based evaluation form which was not available. This would have provided data about how students assess during their capstone performance rotation to determine if self-assessment

improves after third year clerkships. Despite these limitations, we believe this work adds important information about performance across clinical clerkships and over time.

### ***Next Steps***

Integration of self-assessment into pre-clinical courses may allow the development of foundational skills in self-assessment before the clerkship year. We plan to develop a formal self-assessment curriculum that includes opportunities for self-assessment, reflection on performance, feedback, and structured opportunities for students to develop personal learning plans. To further develop student's abilities to develop skills in self-regulated learning we plan to have students use the three things learned about themselves to develop performance goals for their senior year of medical school.

As this work continues, we aim to close the gap between self-assessments and evaluations so that students have a better appreciation of their skills and performance, are receptive to feedback, and can develop plans for improvement to achieve optimal clinical performance (2).

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## **Abbreviation List**

WSUSOM- Wayne State University School of Medicine

SRL- Self-regulated learning

IM-Internal Medicine

Ob/Gyn- Obstetrics and Gynecology

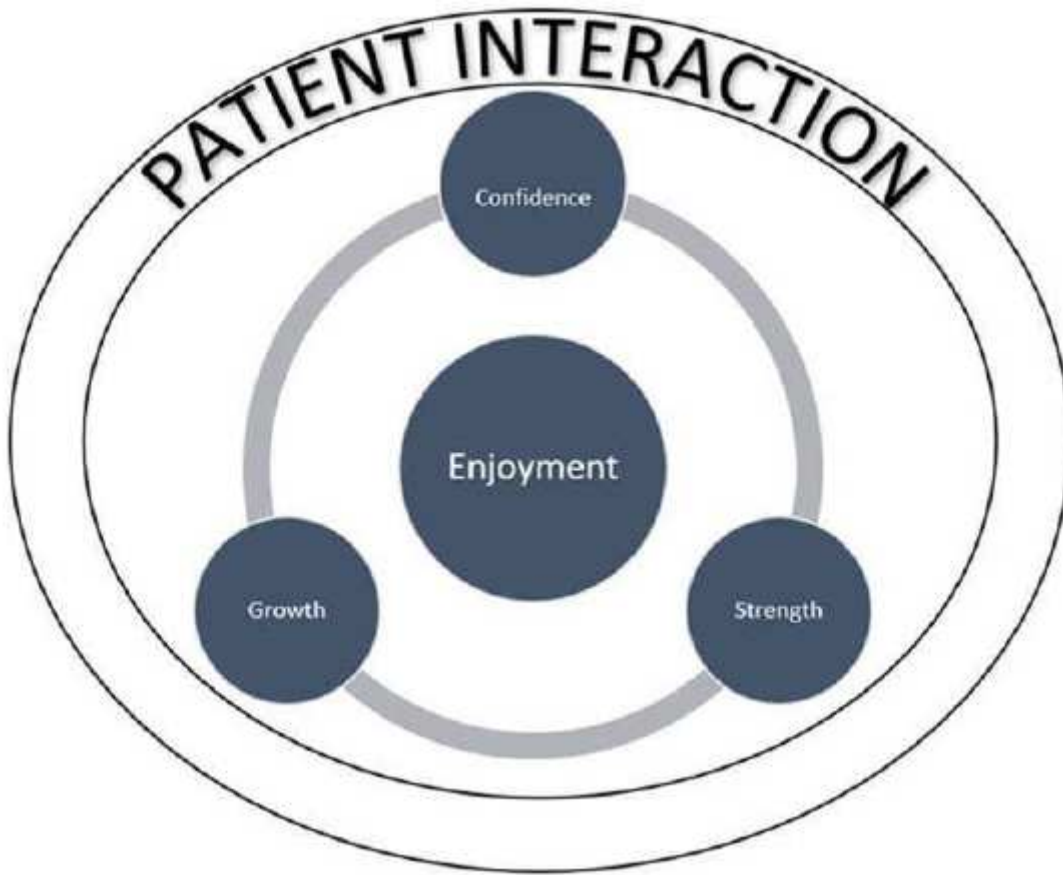
RIME- Reporter, Interpreter, Manager, Educator

FM-Family Medicine

EM- Emergency Medicine

EPAs- Core Entrustable Professional Activities

## Figures



**Figure 1**

Several themes emerged during qualitative analysis; however, the overarching theme was that students learned about themselves through patient interaction (Figure 1).