

RESEARCH

Initial Validation Study of the Self-Rating Scale of Self-Directed Learning (SRSSDL) for Pharmacy Education

Linda S. Behar-Horenstein, PhD, University of Florida, Gainesville, Florida

Diane E Beck, PharmD, University of Florida, Gainesville, Florida

Yu Su, University of Florida, Gainesville, Florida

Corresponding Author:

Linda S. Behar-Horenstein, PhD, University of Florida,
School of Human Development and Organizational Studies in Education
College of Education
Affiliate Professor, College of Dentistry
Department of Community Dentistry and Behavioral Science
Norman Hall, Room 1212
PO Box 110746
Gainesville, FL 32611-7046

ABSTRACT

Objectives. Self-directed learning (SDL) is an essential ability for pharmacy students. Over decades, it has been increasingly emphasized in modern pharmacy education programs.

Methods. In this study, factor analysis was used to identify the factor structure of a self-rating scale of self-directed learning (SRSSDL) among pharmacy students (n=872) and to examine students' self-directed learning (SDL) behaviors by year in the pharmacy educational curriculum.

Results. Five factors "Intrinsic motivation", "Awareness", "Collaboration", "Reflection" and "Application" showed acceptable levels of reliability.

Conclusions. We conclude that the revised 55 item SRSSDL is a valid and homogenous scale of pharmacy students' self-directed learning within one pharmacy program. However, due to differences in factor structure compared to earlier studies further research is needed before broad implementation of this

survey tool in pharmacy education.

Keywords: SDL, SRSSDL, EFA

INTRODUCTION

Due to the rapid advances in healthcare, the knowledge and skills of a Doctor of Pharmacy graduate can quickly become obsolete. This reality has led pharmacy educators to develop curricular approaches that will prepare graduates to be self-directed learners. To assess achievement of this educational outcome, evaluation methods are needed that measure self-directed learning (SDL).

The literature characterizes SDL as a concept with two related components. The first encompasses the personal attributes necessary for SDL such as having a goal orientation, personal autonomy, self-management, and motivation. The second views SDL as an educational process that the learner must be able to enact. For example, Malcolm Knowles described the process as requiring individuals to take initiative and diagnose their learning needs, formulate learning goals, identify learning resources, select and use learning strategies, and self-evaluate achievement of the learning goals.¹ Consistent with these two components, Benedict et al. have defined SDL in pharmacy education as “the development of the skills *and* attitudes necessary to become an independent, confident, and life-long adult learner.”² SDL and lifelong learning are sometimes used interchangeably. However, SDL is seen as a prerequisite for life-long learning.³ Life-long learning refers to individuals moving in and out of educational programs throughout their lifetime.⁴ The literature also asserts that the motivation and ability to be self-directed varies with the context for learning.^{3,5} The ability to be self-directed in learning is influenced by relevant study skills, social, cultural and educational setting, past experience and self-concept. Eva

suggested individuals are limited in their SDL ability because context specificity limits the capacity to self-assess.^{3,6}

The validity of SRSSDL has not been explored for use in pharmacy education. There is also a need to evaluate the change of pharmacy students' SDL as they progress across the curriculum. The purpose of this study was to: 1) explore and validate the factor structure of original SRSSDL scale with pharmacy students enrolled in a four-year Doctor of Pharmacy program at a university located in the southeastern portion of the United States, and 2) assess the differences in the self-directed learning behaviors across different class years of students.

Background of the instrument

Although several authors have published scales for measuring SDL, there have been questions about their validity. Guglielmino's (1977) SDL readiness scale (SDLR) is a practical instrument for measuring individual's attitudes, ability, and skills, necessary for SDL readiness.⁷ However, criticism was leveled against the original SDLR regarding its reliability, validity and failure to confirm its eight-factor structure when applied to various racial and class populations.^{8,9} Recognizing these problems, Fisher et al developed an SDLR and evaluated it using factor analysis.¹⁰ Hendry and Ginns investigated the validity of the Fisher SDLR with medical students.^{10,11} The factors identified in their study with medical students did not correspond well with those initially reported by Fisher that involved nursing students. Hendry and Ginns concluded that the Fisher SDLR was not stable across different types of students and recommended further research.^{10,11}

In 2007, Williamson developed the Self-Rating Scale of Self-Directed Learning (SRSSDL).¹² Instead of measuring readiness like the Guglielmino SDLR and the Fisher SDLR, the SRSSDL was

developed to measure levels of self-directed learning behaviors. Following a review of Guglielmino, Knowles, Candy, Hiemstra and Brookfield's work, Williamson developed list of 75 items related to self-directed learners' attributes, skills and competences.^{5,7, 13-15} Using the Delphi method, the researchers developed an instrument with the 60 items categorized into five board areas, each consisting of 12 items. The categories included: 1) Awareness (understanding the factors that contribute to being self-directed learners); 2) Learning strategies (strategies recommended for being self-directed learners); 3) Learning activities (learning activities often used in self-directed in learning); 4) Evaluation (attributes that help learners monitor their learning activities) and; 5) Interpersonal skills (interpersonal relationships skills considered pre-requisite to becoming self-directed learners). Thirty nursing students then took the survey and rated the items using a five point Likert scale, where 5=always, 4=often, 3=sometimes, 2=seldom, and 1=never. This study did not validate the SRSSDL using factor analysis. The subscales of each area had acceptable internal consistency with Cronbach's alpha coefficients ranging between 0.71 and 0.79. The researchers established construct validity of the scale by comparing the total scale scores of first and final year students.

Cadorin and colleagues determined the factor structure of the Self-Rating Scale of Self-Directed Learning (SRSSDL) by consecutively surveying Italian nursing and radiology students and practitioners who attended hospital sponsored educational seminars and initiatives and workshops between 2009 and 2010.^{16,17} This study sample consisted of 847 participants, including 453 nurses, 141 radiology technicians, 182 nursing students and 68 radiology technician students. Using factor analysis, Cadorin and colleagues developed a revised SRSSDL that consisted of 40 items instead of the original 60 items proposed by Williamson.¹² This Italian version was also found to have 8 factors instead of the five factors

established in the initial version.

METHODS

The 2007 version of the SRSSDL was administered to pharmacy students. As described by Williamson, the scale for responding to the items was 5 = Always, 4 = Often, 3 = Sometimes, 2 = Seldom, and 1 = Never. This survey consisted of 60 items and therefore, a minimum sample size of at least 300 (>5:1 ratio of items: students) was considered necessary to perform factor analysis on the data set.¹⁸ The SRSSDL was administered to all first-, second-, and third-year pharmacy students during the fall semester and to fourth-year pharmacy students at graduation. The students completed a paper-based version of the SRSSDL during a regularly scheduled class session; participation was voluntary. Students were allotted 20 minutes to complete the survey. These students were located on four campuses in the state. The paper-based responses from all four class cohorts were coded and entered into Excel sheet with accuracy of data entry verified by two individuals. Factor analysis of the SRSSDL instrument and other statistical analyses as described below were conducted using SPSS 23.0.

A preliminary analysis was performed to determine whether exploratory factor analysis (EFA) was appropriate for the data set. EFA is a procedure that determines how instrument items are related and whether the items can be categorized into a smaller number of unobserved variables called factors. This preliminary analysis consisted of two tests. The Kaiser–Meyer–Olkin (KMO) Measure of Sampling Adequacy was computed to determine whether there was intercorrelation among the variables within the dataset. A KMO value of >0.30 was considered to infer sampling adequacy. Bartlett's Test of Sphericity was used to determine whether there was redundancy of variables and value of <0.05 inferred sampling

adequacy. Intercorrelations of the items were examined to determine if any items were highly correlated.

Items with correlation values of > 0.9 were removed from the scale.

An exploratory factor analysis (EFA) was then conducted to identify the underlying factor structure that best fit the data. Principle component analysis (PCA) was used to identify the small number of uncorrelated components. Factors were only included if the eigenvalues were >1 . A Scree Plot was done to visually examine the “elbow” curve of eigenvalues. The factor communality was examined to ensure adequacy. The items were considered “weak” if its factor loading was less than 0.3 and were deleted from the scale.¹⁹ After the initial solution was determined, factor loading was rotated by using Varimax rotation to allow factors to be independent and achieve simple factor structure. Cronbach’s alpha (α) was calculated to measure the construct internal consistency of the resulting factors and an α of > 0.60 was considered acceptable.²⁰ Finally, the factor name was labelled based on the theoretical framework.

After the SRSSDL scale was developed and validated, the data set was analyzed to identify any significant differences in SRSSDL scores among the four class years of students. ANOVA and multiple comparison *t*-tests were performed to examine the mean total and factor scores among these four student groups. Fisher’s least squares difference (LSD) correction was used to control for Type I error. The institutional review board (IRB) designated exempt status for this study.

RESULTS

The final data set consisted of 872 participants with first-year students (29.1%), second-year students (28.1%), third-year students (26.7%) and fourth-year students (16.1%). (Table 1) There was a smaller percentage of fourth year students because due to the timing of student attendance on those campuses in which only one of the three campuses were able to

participate in the study. Students on all four campuses had similar GPAs and had performed equally well similar to descriptions of previous cohorts.²¹

Before performing factor analysis, the data were examined and no missing data were identified or recoded. The data set was considered suitable for factor analysis since the KMO sampling adequacy was .96, Bartlett's Sphericity test was significant ($p < .001$) and the inter-correlation among 60 items were generally above 0.3 (56 of 60).

Principal component analysis was then performed to extract the factors. The initial eigenvalues and scree plot revealed that the first five factors explained 49.68% of the variance. The structure with four, five and six factors was then examined separately by using Varimax rotations. The five-factor solution, was determined to be most appropriate based on eigenvalues and scree plot (Table 2). The five factors and their variance are as follows:

Intrinsic Motivation - 31.03%, Awareness - 7.71%, Collaboration - 5.00%, Reflection - 3.44% and Application - 2.51%. Five items were deleted because four of the items loaded on more than one factor and one of the items exhibited weak loading. Specifically, the following items were deleted because they loaded on more than one factor: 1) "I consider teachers as facilitators of learning rather than providing information only" (Item 1.3); 2) "I feel that I am learning despite not being instructed by a lecturer" (Item 1.12); 3) "I find modern educational interactive technology enhances my learning process" (Item 2.11); and 4) "I review and reflect on my learning activities" (Item 4.10). Item 5.12 ("I find it challenging to pursue learning in a culturally diverse milieu") was deleted given its weak factor loading.

The Cronbach's alpha for each factor ranged from 0.662 to 0.962. The internal reliability for the construct is 0.954 (Table 2). Table 3 outlines the final 55-item version of the SRSSDL with categorization into the five factors.

Differences in Self-Rating of Self-Directed Learning Across Student Groups

Construct validity was documented by determining differences in mean total scores among the four student groups. Higher scores indicate higher self-directed learning behaviors. As reported in Table 4, the mean total score of fourth-year students (mean=219.13) was significantly higher than that of second-year students (mean=212.57, $p=.029$). For the "Awareness" factor, fourth year students had a significantly higher mean score than first and second year students. ($p= 0.47$ and $p=.009$) (Table 4). Additionally, second-year students (mean=22.87) had a significantly higher collaboration score than the first-year students (mean=22.03, $p=.02$). No significant results were found for other factors.

DISCUSSION

The current study focused on exploring and validating the factor structure of SRSSDL scale for students enrolled in a Pharm.D. program. This factor analysis categorized the 55 items into five factors similar to the original SRSSDL. However, the items loaded onto the five factors differently in this study with pharmacy students as compared to the original Williamson study.¹² In a preliminary Italian study, Cadarin et al administered the original 2007 survey tool and reported the same five factors as Williamson.¹⁴ However, in the final Italian study where the original 2007 survey was administered to both practitioners and students, there were eight factors.¹⁵ This factor instability suggests further research is needed to assess the stability of factors across different health professional groups and learning

settings.

Others have pointed out that contextual factors such as social, cultural, educational setting, and past experiences impact the ability and motivation of learners to be self-directed.^{3,5, 22} These contextual factors may explain the issues of stability across different health professional groups and learning settings. Therefore, we recommend further research in this area before broad implementation of the 2007 Williamson survey in pharmacy education.

The total and mean score for subcategories were calculated and compared across four group students using multiple-comparison *t*-tests. The results showed that the total mean scores are all above 210. These high scores indicated that pharmacy students had high levels of SDL behaviors across all four class years with an increase across the curriculum. Since first year students completed the survey as they began their curriculum in fall semester, these findings suggest that our pharmacy students have high levels of SDL behaviors as they enter the Pharm.D. program.

Graduating fourth-year students showed a significantly higher total score compared to the second-year students who completed the survey as they started the curriculum ($\rho < .029$). Second, third, and fourth year students experienced the same curriculum and program expectations. Perhaps the curriculum is the reason that students in the fourth year, who have more training and pharmacy-related experience, demonstrated higher SDL behaviors during the learning process. Additionally, the fourth-year students demonstrated significantly higher scores in Awareness compared to first-year ($\rho = .047$) and

second-year students ($p = .009$). Consistent with previous studies, higher self-management or awareness in learning, and identifying study needs results in higher individual career achievement.^{16,23} These results could be a reflection of the students' positive response to the pharmacy curriculum that includes student-centered learning approaches.

The second-year students presented a significantly higher level of collaboration ($p < .047$) compared to the first-year students. This is likely because the first year students were just beginning the curriculum when they completed the survey and the second year students had participated in teamwork and collaboration during their first year. Students generally rated their capacity of self-motivating, effectively reflecting and applying their learning into practice high.¹⁶

Limitation and Suggestions

Worth noting is that first year students' scores were generally high on SRSSDL scale subcategories. As a self-reported assessment was conducted, perhaps these entering students simply provided responses in terms of what they believe should be important and that they over evaluated their ability of SDL skills or simply demonstrated ceiling effect and/or social desirability bias. Another limitation is that the study was carried out only among pharmacy students across four campuses in Florida and access to 4th year students was limited. Also, the study was carried out only on the one-time point. Thus, we lack the information about test retest reliability and generalization of SRSSDL scale for pharmacy education.

CONCLUSION

The present study showed that this 55-item version of the SRSSDL is a homogeneous

and valid tool for measuring SDL behaviors for pharmacy students. However, since it does not identify the same constructs as the original Williamson SRSSDL or the Cadorin et al study, there is a concern about stability. Further study is needed before broad adoption of the SRSSDL in pharmacy education. We also found that compared to second year students, graduating students had a significantly higher total SDL score.

AJPE
Accepted Draft

REFERENCES

1. Knowles MS. Self-directed learning: a guide for learners and teachers. Chicago,IL: Follett Publishing;1975.
2. Benedict N, Schonder K, McGee J. Promotion of self-directed learning using virtual patient cases. *Am J Pharm Educ.* 2013;77(7):Article 151.
3. Greveson GC, Spence JA. Self-directed learning – the importance of concepts and contexts. *Med Educ.* 2005;59:348-49.
4. Ornstein AC, Behar-Horenstein LS (Eds) (1999) Contemporary issues in curriculum, 2nd Ed. Needham Heights, MA: Allyn and Bacon; 1991.
5. Candy PC. Self-direction for lifelong learning: a comprehensive guide to theory and Practice. San Francisco, CA: Jossey-Bass; 1991.
6. Eva KW. On the generality of specificity. *Med Educ.* 2003;37:587–8.
7. Guglielmino LM. Reliability and validity of the self-directed learning readiness scale and the learning preference assessment. In HB Long and Associates, editors. Expanding horizons in self-directed learning. Norman, OK. Public Managers Centre. College of Education, University of Oklahoma;1977:209-221.
8. Long HB, Agyekum SK. Teacher ratings in the validation of Guglielmino's self- directed learning readiness scale. *High Educ.* 1984;13:709-715.
9. Field L. Guglielmino's self-directed learning readiness scale: should it continue to be used? *Adult Educ Q* 1991;41:100-103.
10. Fisher M, King, J. Tague G. Development of a self-directed learning readiness scale for nursing education. *Nurse Educ Today.* 2001;21:516-25.
11. Hendry GD, Ginns P. Readiness for self-directed learning: validation of a new scale with medical students. *Med Teach.* 2009;31:918-920.
12. Williamson SN. Development of a self-rating scale of self-directed learning. *Nurse Res.* 2007;14:66-83.
13. Brookfield SD. Understanding and facilitating adult learning. San Francisco, CA: Jossey-Bass Publishers, 1986.
14. Hiemstra R. Self-directed adult learning. In: Marton F, Phenomenography TH, Postlethwaite TN. (Eds) *Int Encycl Ed.* Oxford: Pergamon Press;1994.
15. Knowles MS. Self-directed learning: a guide for learners and Teachers. Chicago, IL: Follen Publishing,1975.
16. Cadorin L, Suter N, Dante A, Williamson SN, Devetti A, Palese A. Self-directed learning competence assessment within different healthcare professionals and amongst students in Italy. *Nurse Educ Pract.* 2012; 12:153-8.
17. Cadorin L, Bortoluzzi G, Palese A. The self-rating scale of self-directed learning (SRSSDL): a factor analysis of the Italian version. *Nurse Educ Today.* 2013;33:1511- 1516.
18. Mundfrom DJ, Shaw DG, Ke TL. Minimum sample size recommendations for conducting factor analyses. *International Journal of Testing.* 2005;5(2):159-68.
19. Pett MA, Lackey NR, Sullivan JJ. Making sense of factor analysis: The use of factor analysis for instrument development in health care research. Thousand Oaks, CA: Sage Publications, Inc.;2003.

20. DiIorio CK. Measurement in health behavior: Methods for research and evaluation. San Francisco, CA:John Wiley & Sons; 2006.
21. Ried LD, McKenzie M. Preliminary report on the academic performance of pharmacy students in a distance education program. Am J Pharm Educ. 2004;68(3): Article 65.
22. Merriam SB, Caffarella RS. Learning in adulthood. San Francisco, CA: Jossey-Bass;1999.
23. Knowles MS, Holton III EF, Swanson RA. The adult learner: The definite classic in adult education and human resources development. New York, NY:Routledge; 2014.

Table 1. Descriptive statistics for each factor across student year groups

	Student year	N	Mean	Std. Deviation	Std. Error
Intrinsic motivation	1	254	117.87	18.27	1.15
	2	245	115.00	18.16	1.16
	3	233	115.24	21.25	1.39
	4	140	118.84	25.13	2.12
	Total	872	116.52	20.32	0.69
Awareness	1	254	49.47	5.83	0.37
	2	245	49.08	5.39	0.34
	3	233	49.55	5.91	0.39
	4	140	50.67	5.82	0.49
	Total	872	49.57	5.75	0.19
Collaboration	1	254	22.03	3.79	0.24
	2	245	22.87	4.08	0.26
	3	233	22.45	4.29	0.28
	4	140	22.38	3.96	0.33
	Total	872	22.44	4.04	0.14
Reflection	1	254	15.37	3.79	0.24
	2	245	14.72	3.56	0.23
	3	233	14.87	3.94	0.26
	4	140	15.21	3.87	0.33
	Total	872	15.03	3.79	0.13
Application	1	254	11.66	1.95	0.12
	2	245	11.73	1.83	0.12
	3	233	11.62	2.11	0.14
	4	140	12.02	1.95	0.17
	Total	872	11.73	1.96	0.07
Total	1	254	217.25	27.13	1.70
	2	245	212.57	25.96	1.66
	3	233	213.72	28.86	1.89
	4	140	219.13	32.98	2.79

Table 2. Component, item-loadings, explained variance and internal consistency of SRSSDL for pharmacy education.

	Component					Total
	1	2	3	4	5	
Item 1.1	.624					
Item 1.2	.724					
Item 1.4	.384					
Item 1.5	.604					
Item 1.6	.595					
Item 1.7	.691					
Item 1.8	.688					
Item 2.7	.597					
Item 2.8	.447					
Item 2.9	.556					
Item 2.12	.721					
Item 1.9		.132				
Item 1.10		.085				
Item 1.11		.252				
Item 2.1			.624			
Item 2.2			.654			
Item 2.3			.682			
Item 2.4			.709			
Item 2.5			.693			
Item 2.6			.508			
Item 2.10				.604		
Item 3.1				.509		
Item 3.3				.590		
Item 4.9				.591		
Item 4.10				.527		
Item 3.4					.657	
Item 3.5					.483	
Item 3.6					.423	
Item 3.7					.558	
Item 3.8					.706	
Item 3.9					.611	
Item 3.10					.690	
Item 3.11					.738	
Item 3.12					.522	
Item 4.1					.605	

Table 2. Continued

	Component					Total
	1	2	3	4	5	
Item 4.2	.701					
Item 4.3	.720					
Item 4.4	.746					
Item 4.5	.640					
Item 4.6	.687					
Item 4.7	.696					
Item 4.8	.638					
Item 4.11	.548					
Item 4.12	.604					
Item 5.1	.626					
Item 5.2	.774					
Item 5.3	.763					
Item 5.4	.753					
Item 5.5	.645					
Item 5.6	.775					
Item 5.7	.724					
Item 5.8	.715					
Item 5.9	.706					
Item 5.10	.642					
Item 5.11	.705					
Variance		7.706%	4.996%	3.439%	2.512%	49.683%
	31.029%					
Cronbach α	.860	.632	.788	.662	.962	0.954

Table 3. Final 55-Item Version of the SRSSDL after factor analysis with notation of the factor number in the original Williamson instrument

Factor 1 Intrinsic Motivation (12 items)

- 1.1 I identify my own learning needs/ Awareness
- 1.2 I am able to select the best method for my own learning/Awareness
- 1.4 I keep up to date on different learning resources available/Awareness
- 1.5 I am responsible for my own learning Awareness
- 1.6 I am responsible for identifying my areas of deficit/Awareness
- 1.7 I am able to maintain self-motivation/Awareness
- 1.8 I am able to plan and set my learning goals/Awareness
- 2.7. My inner drive directs me towards further development and improvement in my learning/
Learning Strategies
- 2.8 I regard problems as challenges/Learning Strategies
- 2.9 I arrange my self-learning routine in such a way that it helps develop a permanent learning culture in my life/Learning Strategies
- 3.2 I identify the important points when reading a chapter or an article/ Learning Activities
- 2.12 I am able to decide my own learning strategy/Learning Strategies

Factor 2 Awareness (3 items)

- 1.9 I have a break during long periods of work/Awareness
- 1.10 I need to keep my learning routine separate from my other commitments/Awareness
- 1.11 I relate my experience with new information/Awareness

Factor 3 Collaboration(6 items)

- 2.1 I participate in group discussions/Learning Strategies
- 2.2 I find peer coaching effective/Learning Strategies
- 2.3 I find 'role play' is a useful method for complex learning/ Learning Strategies
- 2.4 I find inter-active teaching-learning sessions more effective than just listening to lectures/
Learning Strategies
- 2.5 I find simulation in teaching-learning useful/ Learning Strategies
- 2.6 I find learning from case studies useful/ Learning Strategies

Factor 4 Reflection (4 items)

- 2.10 I find concept mapping is an effective method of learning/ Learning Strategies
- 3.1 I rehearse and revise new lessons/Learning Activities
- 3.3 I use concept mapping/outlining as a useful method of comprehending a wide range of information/Learning Activities
- 4.9 I check my portfolio to review my progress/Evaluation

Factor 5 Application (30 items)

- 3.4 I am able to use information technology effectively/ Learning Activities

- 3.5 My concentration intensifies and I become more attentive when I read a complex study content attentive when I read a complex study content/ Learning Activities
- 3.6 I keep annotated notes or a summary of all my ideas, reflections and new learning/ Learning Activities
- 3.7 I enjoy exploring information beyond the prescribed course objectives/ Learning Activities
- 3.8 I am able to relate knowledge with practice/ Learning Activities
- 3.9 I raise relevant question in teaching-learning sessions/ Learning Activities
- 3.10 I am able to analyse and critically reflect on new ideas, information or any learning experiences ideas, information or any learning experiences/ Learning Activities
- 3.11 I keep an open mind to others' point of view/ Learning Activities
- 3.12 I prefer to take any break in between any learning task/ Learning Activities
- 4.1 I self-assess before I get feedback from instructors/Evaluation
- 4.2 I identify the areas for further development in whatever I have accomplished/Evaluation
- 4.3 I am able to monitor my learning progress/Evaluation
- 4.4 I am able to identify my areas of strength and weakness/Evaluation
- 4.5 I appreciate when my work can be peer reviewed/Evaluation
- 4.6 I find both success and failure inspire me to further learning/Evaluation
- 4.7 I value criticism as the basis of bringing improvement to my learning/Evaluation
- 4.8 I monitor whether I have accomplished my learning goals/Evaluation
- 4.11 I find new learning challenging/Evaluation
- 4.12 I am inspired by others' success/Evaluation
- 5.1 I intend to learn more about other cultures and languages I am frequently exposed to/ Interpersonal Skills
- 5.2 I am able to identify my role within a group/ Interpersonal Skills
- 5.3 My interaction with others helps me to develop the insight to plan for further learning/ Interpersonal Skills
- 5.4 I make use of any opportunities I come across/ Interpersonal Skills
- 5.5 I need to share information with others/ Interpersonal Skills
- 5.6 I maintain good inter-personal relationships with others/ Interpersonal Skills
- 5.7 I find easy to work in collaboration with others/ Interpersonal Skills
- 5.8 I am successful in communicating verbally/ Interpersonal Skills
- 5.9 I identify the need for inter-disciplinary links for maintaining social harmony/ Interpersonal Skills
- 5.10 I am able to express my ideas effectively in writing/ Interpersonal Skills
- 5.11 I am able to express my views freely/ Interpersonal Skills

Table 4. Multiple comparison tests

Dependent Variable	Student Year	Student Year	Mean Difference	Std. Error	Sig.
Awareness	4	1	1.203	.603	.047
	4	2	1.590	.607	.009
Collaboration	2	1	.841	.362	.020
Total mean score	4	2	6.561	3.000	.029

AJPE
Accepted Draft