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Perception towards personal enrichment competency modules and interprofessional collaboration readiness among students

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ABSTRACT

Background: To evaluate the correlation between perception towards Personal enrichment competency (PEC) modules effectiveness and interprofessional collaboration readiness among students.
Materials and Methods: A cross-sectional study design was used. Two different variables were used to measure the perception towards PEC modules and the readiness for interprofessional collaboration; this was done using the readiness for interprofessional learning scale (RIPLS). A convenience sampling method was used. The respondent was drawn from current medical, health science and pharmacy undergraduate students from the first year to the fifth year in a private University in Malaysia. A Spearman's rank-order correlation test was run to determine the statistical relationship between both variables.
Results: The scores for the perception towards PEC modules (inclusive of overall scores, content structure, practicum and assessment) and readiness towards IP learning (comprised of teamwork and collaboration, negative professional identity, positive professional identity and roles and/or responsibilities) showed above average score (4.04 ± 0.92 and 3.77± 0.81 respectively) among students of various healthcare programs. There was a strong, positive correlation between PEC module effectiveness and IP collaboration readiness, which was statistically significant ($r = 0.713$, $p < 0.001$).
Conclusion: There was an effective PEC delivery among undergraduates in medical school, pharmacy school and faculty of health sciences. Undergraduates in medical school, pharmacy school and faculty of health sciences were shown to be ready for interprofessional collaboration when entering professional careers. Interprofessional learning should be incorporated into the curriculum such as in the PEC modules for all medical, health science and pharmacy programs, which may nurture students to become more competent healthcare givers and appreciate each professional role.

1. Introduction

Human populations currently face difficult healthcare tasks.[1] Today, medical delivery has gone from a single effort to a group, interprofessional and team-based focus. A physician alone in the current medical care is hardly able to fulfil or satisfy the patient's needs. A good healthcare therapeutic union is made up of workers from many areas as well as the care seeker, family and caregiver. Early studies must therefore include in their education system an interprofessional method of education.[2–4] Learners start to think that in other areas, their careers and their lives must be symbiotic, truly perform and effective. Unconnected learning and working together at the same place in a different atmosphere may not be enough. Via a structured cross-institutional curriculum, some degree of interprofessional work and projects are essential.[5] Senior medical students are also undertaking community-based

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healthcare programmes with nursing, allied health, dental and even social work school students in an interprofessional manner. This indicates that interprofessional leadership is becoming more apparent when many diseases and medical conditions need to be controlled. It is a multi-handed strategy, with all the important hands on the deck. The closely interconnected and inter-woven systems of health care suggest that it is important to work together. Summarising the structure of the health care system through multiple professions.[1,6]

In the health education system, the advancement of evidence-based practice is educating students in group-based performance or interprofessional collaborative activities.[7] The inclusion of interprofessional education (IPE) into accreditation requirements was expected by several organisations accrediting health education.[8] IPE is described as learners from two or more lines of work learning from each other to allow for real interactions and to obtain better health outcomes.[9] Clinicians and healthcare workers can handle their care, diagnostic processes and teamwork as soon as they share a common goal and know who, when, where and how team members need to organise their activities and cooperate in a timely and accurate manner. Healthcare IPE is assessed as a key factor in the delivery of patient-centred, approachable and outstanding care.[10] Synchronisation can help to bring groups into teams with an emphasis on the patient and the whole healthcare process by acknowledging, and managing objectives and roles and interdependent care work.[11] When skills required to handle complex patient service chains are learned, such as the disease diagnosis process, IPE is central. To ensure the best outcomes, early detection of any disease involves a range of professional approaches. This reality also affects the theoretical and practical education and practice of healthcare workers.[12] Several IPE benefits have been identified, such as enhanced cooperation and collaboration[13] efficiency of education[10] and the provision of patient-centred, responsive and quality healthcare services.[14] Concerning learning modules, all these problems are central to the education of interprofessional working techniques.[15]

Previously explained a shared practice immersive IPE module that minimises now overcrowded clinical curricula, particularly for nursing and speech pathology, in healthcare settings.[16] Although the results of IPE modules are favourable (Holland, 2018), further exploratory research, particularly on various other healthcare disciplines, is still needed. One of the modules that is currently being used is implementing Personal Enrichment Competency (PEC) modules in the healthcare education system. By integrating with the healthcare education system, the PEC modules program aims to develop student's soft and interpersonal skills to become more holistic graduates. The focus of the program includes teamwork, communication, leadership, ethics and values in interprofessional education (IPE). Other than that, PEC also focuses on elements to deliver compelling learning experiences within an interactive curriculum that enhances the graduate employability rate.

The main objective of the current study was to determine interprofessional readiness across the medical, pharmacy, and health science disciplines, and its correlation to personal enrichment competency (PEC) modules by providing insight into the education of healthcare undergraduates. This encourages future improvisation and constructive collaboration in healthcare education to be carried out to improve healthcare delivery when beginning a profession.

2. Materials and Methods

2.1. Research approach

An exploratory, cross-sectional study design, using a quantitative method, was conducted between October 2020 and September 2021 at a Private University in Shah Alam, Selangor, Malaysia. The standardised questionnaire for undergraduate medical and health science students from the International Medical School (IMS), the Faculty of Health Sciences (FHLS) and the School of Pharmacy was distributed, followed by numerical analyses. All undergraduate programmes have integrated interprofessional learning (IPL) in their curriculum through the Personal Enrichment Competency (PEC) modules. The sample was taken from all undergraduate students enrolled in the faculties from year 1 to year 4.

2.2. Study population

The study population for this research includes undergraduate medical and health science students from the International Medical School (IMS), Faculty of Health Sciences (FHLS), and School of Pharmacy. Convenience sampling was undertaken. The population size depends on the total number of students who have undertaken the PEC classes which is 799. The sample size was calculated using Raosoft software.[17] By considering the total population of students during the study period; power was kept at 80%; response distribution at 50%; the confidence interval was set at 95 and the margin of error was set as 5%. Based on the calculation, the total number of participants required in this study was 260. All the students were invited to participate in the study. Students who were not interested in participating were excluded from this study.

An informed consent from all respondents has been obtained before the distribution of the questionnaire. Following that, participation in this study was voluntary. The survey was conducted following the ethical standards of the Institutional Review Board, and the study was reviewed, with the permission of the Ethics Committee and in the context of educational settings, based on regular educational strategies. The ethical approval code for this study is

MSU-RMC-02/FR01/01/L1/020. All collected data from undergraduate medical and health science students through questionnaires and interviews were considered private and confidential and were not strictly used for any other purpose. Students were free to interrupt or withdraw from study at any point in time.

2.3. Study development

The research consisted of a questionnaire for the quantitative assessment. The questionnaire was developed in English. This was done because students are familiar with the English language to comprehend the purpose of the research. The students were allowed to fill in the answers to the questions anonymously after an explanation of each question by the researcher. This was done to avoid bias.

The first part of the questionnaire included items for the collection of demographic data: gender, ethnicity, previous healthcare experience and year of education. Students were not required to give their names. Two segments were the main component of the survey. The first segment contained concerns about the perception towards PEC module delivery while the second segment contained interprofessional criteria and its implementation in the field of health sciences. These PEC modules include communication skills, ethics and values in IPE, teamwork skills and leadership skills. Participants were encouraged to provide their interpretations, reflections and opinions on the modules. The questionnaire components were digitally stored from the questionnaire through the spreadsheet software and then their numerical transcripts were made.

The second part contained the Readiness for Interprofessional Learning Scale (RIPLS) which was adapted from Maharajan et al. (2017)[18] it enabled the students to reflect on various aspects of IPL and was used to measure student readiness or student beliefs about IPL. A 5-point Likert Scale of psychometry including strongly agree = 5, agree = 4, neutral = 3, disagree = 2 and strongly disagree = 1 was used to analyse the students' responses.[19] The study tool has a total of 19 self-reported items under four different items. Items 1 focused on the aspects of teamwork and collaboration (questions 1 until 9). Item 2 focused on negative professional identity towards other professions (question 10 until 12). The questions in these items were negatively worded and therefore these questions were reversely scored to calculate the overall mean score comprising strongly disagree = 5, disagree = 4, neutral = 3, agree = 2 and strongly agree = 1. Item 3 focused on positive professional identity (questions 13 until 16). Item 4 focused on the roles and responsibilities of professionals (questions 17 until 19). A higher mean score represents a positive attitude towards IPL. The digital data will then be analysed using IBM SPSS Software Version 24.

2.4. Statistical analysis

For all quantitative analysis, the Statistical Package for Social Science (SPSS) software version 20.0 was used. The correlation test is used to calculate the significant differences.

3. Results

3.1. Demographic study

The results showed that 65.38% of female and 34.62% of male students from three disciplines which include medicine, pharmacy and health science participated in the study. Percentages for ethnicity showed 50.77% to be Malay, 15.38% Chinese, 26.15% Indian, 4.62% Bumiputera and 3.08% Expatriate among the health cluster undergraduate students. Respondents include students from Year 1 (60.77%), Year 2 (13.08%), Year 3 (18.46%), and Year 4 (7.69%). The Year 5 students of the medical program were excluded from this study since they are not involved in current PEC modules. The outcome showed that 56.92% of respondents said yes and the remainder had no early exposure to IP in previous education.

The following data showed that most respondents were medical (75.00%) followed by health science (13.46%) and pharmacy (11.54%).

Table 1: Demographic data

Variable	Descriptor	n (%)
Gender	Male	170 (65.38)
	Female	90 (38.61)
Year of Education	Year 1	158 (60.77)
	Year 2	34 (13.08)
	Year 3	48 (18.46)
	Year 4	20 (7.69)
Ethnicity	Malay	132 (50.77)
‘	Chinese	40 (15.38)
	Indian	68 (26.15)
	Bumiputera	12 (4.62)
	Expatriate	8 (3.08)
Prior Exposure to IPE	Yes	148 (56.92)
	No	112 (43.08)
Discipline	Medicine	195 (75.00)
	Pharmacy	30 (11.54)
	Health Science	35 (13.46)

3.2. Perception towards personal enrichment competency module delivery scores

The results of this questionnaire on the perception towards Personal Enrichment Competency (PEC) module delivery reported above average scores for all aspects, including overall scores, structure of modules, projects and evaluation. The highest scores for this assessment include ‘At the

beginning of each session, all educational objectives were clearly defined' with a mean score of 4.21 ± 0.79 indicating the students were well elaborated and understood the main objectives of the session before the start. 'The learning style was engaging and interesting' was also shown to be among the highest scores for the assessment with an average of 4.15 ± 0.89 scores. This means the students enjoyed each of the sessions with an attractive way of learning for the delivery of content. Other than that, 'More of these modules should be organized in the future' also contributed to the highest scores with an average of 4.11 ± 0.89 scores from students. This also revealed that the delivery of the modules was shown to attract the students' attention and at the same time proved to be effective.

Table 2: Perception towards effectiveness of PEC module delivery scores

Items	Mean	SD
1. At the beginning of each session, all educational objectives were clearly defined	4.21	0.79
2. The worksheet given prior to the session was very useful for understanding the topic	4.07	0.88
3. Sources in the worksheet, such as web sources, have given rise to interest in reading	3.84	0.94
4. The learning style was engaging and interesting	4.15	0.89
5. This module provided sufficient knowledge for future applications	4.07	0.92
6. More of these modules should be organized in the future	4.11	0.89
7. Time allocated to the preparation/group discussion was adequate	3.87	1.00
8. This method has allowed me to participate actively in the subject	3.98	0.97
9. An enjoyable way to learn	4.05	1.04
10. Team-based activity made it easy for me to get through the subject	4.07	0.93
11. The overall experience of the module is excellent	4.05	0.93
12. Positive impression of the module on student occupation and personal life	4.13	0.86
13. Students have structured their learning	3.98	0.92
14. Effective practicum/case/project learning	4.00	0.93
15. Effective assessment of modules	4.00	0.91
Total	4.04	0.92

3.3. Readiness for interprofessional collaboration by using RIPLS scores

The results showed the average of teamwork and collaboration, negative professional identity, positive professional identity and roles and responsibilities. Specifically, students from all the faculties have answered item 1 teamwork and collaboration with an average of 4.27 ± 0.71, representing 'agree' for the preparedness of teamwork and collaborative work. Also, for item 2, the students have positive results on professional identity toward interprofessional collaboration with an average of 3.31 ± 1.22 which is parallel with item number 3 with an average of 4.24 ± 0.74 scores. Moreover, the result for item number 4 also revealed more than average scores which indicated almost 'agree' for roles and responsibilities toward interprofessional collaboration with 3.77 ± 0.81 among the total student respondents.

3.4. RIPLS and its domain scores for both genders

Table 4 shows the result of the RIPLS and its domain scores for both genders (mean and standard deviation).

3.5. RIPLS and its domain scores for different years of study

The following table shows the RIPLS and its domain scores for different years of study (mean and standard deviation).

3.6. RIPLS and its domain scores for each discipline

Table 6 shows the RIPLS and its domain scores for each discipline (mean and standard deviation).

3.7. Correlation analysis

The Spearman Rank-Order Correlation Test was run to determine the relationship between the PEC and the IP. This is because both variable data have been reported to not pass the normality test and to be considered non-parametric. There was a strong, positive correlation between PEC Efficiency and IP Collaboration Readiness which was statistically significant ($r = 0.713$, $p < 0.001$).

4. Discussion

Many researchers worldwide have defined the positive effects of interprofessional practice on improved patient care. Patient-centric care is critical and can be promoted by IP collaboration in medical and healthcare-related education initiatives.[20] The degree of IP collaboration student preparedness predicts the probability that, as potential healthcare providers, they will participate in interprofessional practice. The latest studies have shown that students from different health professional courses are prepared to recognise IPL as an essential aspect of healthcare. During their studies, students from various programmes enjoyed the role of shared learning with other health professional courses in recognising and addressing clinical problems.[21–23] Stated that shared learning experiences affect the expectations and attitudes

Table 3: Readiness for IP collaboration by using RIPLS scores

	Items	Mean	SD
	Teamwork and collaboration		
1.	Learning with other students will make me a more effective healthcare team member	4.20	0.89
2.	Patients would ultimately benefit if healthcare students worked together	4.29	0.80
3.	Shared learning with other healthcare students increase ability to understand clinical problems	4.27	0.79
4.	Communication skills with other health students should be learned	4.27	0.82
5.	Team-working skills are vital for all healthcare students to learn	4.36	0.83
6.	Shared learning will help me to understand my own professional limitations	4.28	0.81
7.	Learning between healthcare students improve working relationships after qualifications	4.21	0.83
8.	Shared learning will help me think positively about other healthcare professionals	4.25	0.79
9.	In order for small groups to learn to work, students must respect and trust each other.	4.32	0.88
	Total	**4.27**	**0.71**
	Negative professional identity		
10.	I don't want to waste time learning with other healthcare students*	3.48	1.36
11.	It is not necessary for undergraduate healthcare students to learn together*	3.35	1.40
12.	Clinical problem solving can only be learned effectively from my own school programme with students. *	3.11	1.35
	Total	**3.31**	**1.22**
	Positive professional identity		
13.	Shared learning with other healthcare professionals helps to communicate better	4.23	0.89
14.	I would welcome the opportunity to work on small group projects with other healthcare students	4.21	0.78
15.	Shared learning will help me to clarify the nature of the problems of patients or clients.	4.26	0.79
16.	Shared learning before qualification helps me to become a better team worker	4.27	0.79
	Total	**4.24**	**0.74**
	Roles and responsibilities		
17.	The role of allied health professionals is primarily to provide support to physicians	4.00	0.92
18.	I am not sure what my professional role will be	3.37	1.40
19.	I need to acquire a lot more knowledge and skills than other students.	3.93	0.97
	Total	**3.77**	**0.81**

*Negatively worded item was reverse-scored to calculate the overall mean score.

Table 4: RIPLS and its domain scores for both genders (mean and standard deviation)

	Female Mean (SD)	Male Mean (SD)	F-ratio
PEC Delivery	3.95 (0.74)	4.20 (0.82)	F (1, 258) = 6.43 p = 0.012
RIPLS	3.98 (0.56)	4.14 (0.59)	F (1, 258) = 4.98 p = 0.027
Teamwork and collaboration	4.24 (070)	4.34 (0.73)	F (1, 258) = 1.20 p = 0.274
Negative professional identity	3.19 (1.21)	3.53 (1.20)	F (1, 258) = 4.26 p = 0.032
Positive professional identity	4.20 (0.74)	4.32 (0.73)	F (1, 258) = 1.40 p =0.238
Roles and responsibilities	3.68 (0.81)	3.94 (0.78)	F (1, 258) = 6.27 p = 0.013

Table 5: RIPLS and its domain scores for different years of study (mean and standard deviation)

	Year 1 Mean (SD)	Year 2 Mean (SD)	Year 3 Mean (SD)	Year 4 Mean (SD)	F-ratio
PEC Delivery	4.09 (0.75)	3.87 (0.93)	4.042 (0.73)	3.94 (0.78)	F (3, 256) = 0.85 p = 0.468
RIPLS	4.05 (0.54)	3.87 (0.75)	4.07 (0.57)	4.11 (0.56)	F (3, 256) = 1.16 p = 0.325
Teamwork and collaboration	4.35 (0.64)	3.96 (0.96)	4.25 (0.71)	4.22 (0.68)	F (3, 256) = 2.89 p = 0.036
Negative professional identity	3.19 (1.25)	3.53 (1.10)	3.38 (1.27)	3.77 (0.92)	F (3, 256) = 1.90 p = 0.130
Positive professional identity	4.31 (0.71)	4.04 (0.84)	4.15 (0.73)	4.24 (0.71)	F (3, 256) = 1.61 p = 0.188
Roles and responsibilities	3.65 (0.72)	3.69 (1.01)	4.12 (0.81)	3.95 (0.87)	F (3, 256) = 4.72 p = 0.003

Table 6: RIPLS and its domain scores for each discipline (mean and standard deviation)

	Medicine Mean (SD)	Pharmacy Mean (SD)	Health Science Mean (SD)	F-ratio
PEC Delivery	3.97 (0.68)	4.01 (0.80)	4.28 (0.67)	F (2, 257) = 1.76 p = 0.174
RIPLS	4.02 (0.54)	4.02 (0.59)	4.14 (0.54)	F (2, 257) = 0.62 p = 0.541
Teamwork and collaboration	4.24 (0.72)	4.30 (0.71)	4.13 (0.74)	F (2, 257) = 0.77 p = 0.466
Negative professional identity	3.23 (1.34)	3.23 (1.24)	3.91 (0.62)	F (2, 257) = 4.21 p = 0.016
Positive professional identity	4.29 (0.66)	4.26 (0.74)	4.067 (0.81)	F (2, 257) = 0.99 p = 0.374
Roles and responsibilities	3.77 (0.87)	3.65 (0.79)	4.52 (0.32)	F (2, 257) = 17.11 p = 0.000

Table 7: Correlation analysis

Correlations			
		PEC Modules	**IP Readiness**
PEC Modules	Correlation Coefficient	1.000	.713**
	Sig. (2-tailed)	.	.000
	N	260	260
IP Readiness	Correlation Coefficient	.713**	1.000
	Sig. (2-tailed)	.000	.
	N	260	260

**. Correlation is significant at the 0.01 level (2-tailed).

of students towards IPL and help them plan for potential collaborative practice.[23] Morison et al. found that in learning about teamwork and the role of other healthcare practitioners, medical students enjoyed shared learning sessions.[24] Our outcomes are consistent with this study. In our research, the respondents agreed that their shared learning experience can improve their communication skills, especially when managing their patients as well as communicating with different healthcare providers. One of the key factors for good collaborative practice in healthcare is to develop communication skills.[25] The lowest score of the current investigation on IP collaboration readiness for the questions 'I need to acquire a lot more knowledge and skills than other students' and 'I'm not sure what my professional role would be' suggested a limited understanding of the positions and responsibilities of the students. It is of great significance to recognise their professional position in the healthcare team[26] and a lack of clarification about these positions can result in them not working well with other health professionals. Students cannot clearly understand the importance of intra- and inter-professional relationships. Therefore a

standard curriculum structure must be established for all students of the healthcare profession and a forum for interprofessional communications was created during the early stages of their professional education[27] in this study, implementation was made on the PEC modules. Each healthcare professional should be able to recognise and appreciate the unique differences between the different disciplines in the healthcare sector while also working as a team.[28] Both quantitative and qualitative assessments of the students revealed that they are surely going to work well with individuals if they are from their professions. They are also prepared to share information and resources with other professionals. Understanding the attitudes of students towards other professions would be a central factor in the preparation of interprofessional curricula to achieve a common goal. Attitudes for students need to be established at the entry-level of the programme, as they have their judgements and expectations at that point.[29] Thus, in the early years of their professional education, IP collaboration should be included before the stereotyping of other health professionals develops.[30] This is reinforced by an earlier study demonstrating that 'contact hypotheses' allow the group to shift their views about IP collaboration and can have a major effect on their perceptions towards interprofessional practice.[31] Horsburgh et al., stated that undergraduate students assumed that they needed more expertise and experience than other allied healthcare providers.[22] This may have a broader effect on their attitudes towards interprofessional relationships and may have led to their attitudes towards IPL. Such variables, such as the learning environment and their openness to cooperation with other professions, will eventually play a role in their expectations and attitudes.

The mean scores for the RIPLS items 'teamwork and collaboration' and 'positive professional identity' were not significantly different among undergraduate students from three different disciplines. This signifies those students from all disciplines are prepared to work together, fostering healthy working relationships. To fully understand the role of other healthcare professionals in the healthcare team, at the early stages of their professional career, each student in healthcare must realise their own professional identity. This will allow them to change for the better linking with their peers from other professions and improving their ability to solve issues related to healthcare together.[32] Other than that, all students must concentrate on the curriculum and include an opportunity to learn and practice interprofessional teamwork in healthcare. Another important finding from the Individualized Educational Plan (IEPS) in the previous study was the difference in the field of 'competence and autonomy' between medical students and other disciplines.[33] The longer length of the medical course and increased experience in the clinical setting may have affected the understanding of interprofessional practice among medical students.[34] Medical students also have more observation-based learning and routine clinical experience during their coursework.

In parallel with those results in the assessment of perception on PEC modules delivery, there is a strong readiness of students to enter the real work environment. Based on the previous report analysis of the RIPLS, data showed that the attitudes of students towards IP collaboration changed over the years of study.[18] Likewise, Lindqvist et al. reported that the years of study and the RIPLS scores have a significant link.[29] Owing to their increased clinical work experience in later years, the shift in their thinking about the tasks and obligations of each career and their awareness of the need for collaboration may be due to the longer periods of higher-order thinking associated with later phases of the course. The students' roles have steadily grown over 2 to 4 years and their responsibilities have increased. This observation has shown that the attitudes of learners will change with the time spent in their academic institutions and practice facilities. Interactions with instructors and learners on the clinical site can also boost this.[35] Students from each discipline need to learn skills to practice within a multi-professional healthcare team to produce improved patient outcomes. Educators and policymakers should build ways to monitor student behaviours and perceptions qualitatively.[36]

Since IP collaboration integrates multi-dimensional and varied subjects, several studies have shown that they examine its usefulness in the field of individual education approaches and disciplines. Cohen et al. compared the knowledge of U.S. trainees in medicine, nursing, occupational, physical and music therapy, medical assistant, and social work trainees vs. controls, before and after a protocol-driven Parkinson's disease training programme.[37] In all major outcomes, including self-perceived ($p<0.001$) and objective knowledge ($p<0.001$), recognising the role of other disciplines ($p<0.001$), and attitudes towards the scale of health care teams ($p<0.001$), the findings showed statistically significant post-test improvement. A continuous and positive gain in awareness of Parkinson's disease, team strategies and role of other disciplines, and team attitudes was also confirmed by the qualitative research. In another research, Sergeant et al. produced four 2-h interprofessional communication skills workshops for Nova Scotia Health Professionals and implemented a mixed-method assessment template to evaluate pre-post-workshop results and follow-up phases.[38] Of a total of 518 practitioners from 20 disciplines, all workshops showed substantial changes in pre-post paired t-tests ($p \leq 0.05$). As many as 87% of doctors showed positive improvements in the reactions of their patients. The investigators urged the need for institutional administration to support facilitators in the implementation and sustainability of the IPE programme.

This study indicates that improving the early exposure of more students to interprofessional collaboration, particularly at the very early stage of the implementation of programmes for a clearer context and valuable insights in the delivery of knowledge. Organisations as well as the government can take further action by using the basic information in this study to imply a degree of improvisation in terms of the delivery of educational content. This may help to improve the healthcare sector in a wide range of disciplines. Most vital action is likely to determine the severity of the current situation and, as a result, to implement newer policies in Malaysia to promote growth in the healthcare industry. Apart from this, students will also benefit from this study as it will help them gain a deeper insight into the body of knowledge.

The limitation of this current methodology is that the respondents are from the medicine, pharmacy and health science disciplines only. In addition, it is only undergraduate students who have participated in the current study without the participation of postgraduate candidates which is outside the scope of this research. As such, it is suggested that data collection involving all study levels and programs from a specific university be carried out for future research. This study can also be performed for collaborative or joint research works covering a certain number of universities or a distinct region. Therefore, as there is less bias or errors, their responses will be more valuable. This will provide a better understanding of how PEC modules work in IP collaboration readiness. Figure 1 summarises the theoretical framework of the research.

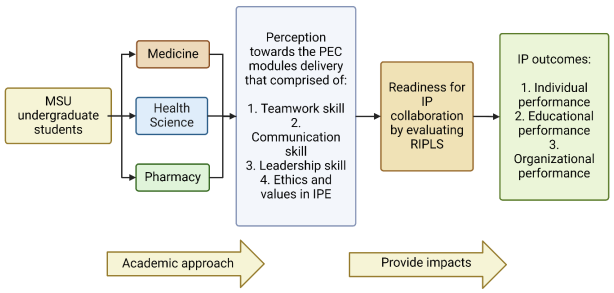

Figure 1: Theoretical framework

5. Conclusion

Perception towards PEC module delivery among undergraduates in the medicine, pharmacy and health science disciplines has taken place. Undergraduates in these disciplines have shown that they are ready for interprofessional collaboration when entering their professional careers. A Spearman Rank-Order Correlation Test was run to determine the relationship between both perceptions towards PEC module delivery and readiness for IP collaboration. There was a strong, positive correlation between PEC Effectiveness and IP Readiness, which was statistically significant ($r = 0.713$, $p < 0.001$). New knowledge on these two variables in healthcare education has been generated. The results of the study suggest that PEC is one of the potentials yet effective modules for a better healthcare education system and for improving the readiness of undergraduates to enter the real work environment.

6. Source of Funding

None.

7. Conflict of Interest

None.

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