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Enhancing Generic Skills Through Active Learning: A Quantitative Analysis of Fourth-Year Medical Students at Medical Education Elective Block

Gisella Anastasia, Natalia Puspadewi

Medical Education Unit, School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia, Jakarta, INDONESIA

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ABSTRACT

Healthcare professionals should excel not only in academics but also in generic skills to provide high-quality care. Diverse active learning approaches are strongly believed to enhance generic skills development; however, studies supporting it are limited, particularly in Asia. This quasi-experimental quantitative study, using a one-group pre-test post-test design, aimed to determine the impact of thoughtfully designed active learning approaches, such as project-based learning, flipped classrooms and mentoring, used in the medical education (ME) elective block on generic skills development of fourth-year medical students at Atma Jaya Catholic University of Indonesia, Jakarta. Thirty-five of 36 students admitted to the ME elective block and who completed the Indonesian adaptation of the generic skills self-assessment questionnaire were included and then randomly divided into four groups. The questionnaire has six domains: analytical, perseverance, teamwork, communication, social judgement and global abstraction. Data was analysed using the Wilcoxon signed-rank test, performed using IBM SPSS version 22. Social judgement skills had the lowest score (Mdn_{pre} = 3.00, IQR_{pre} = 1.50; Mdn_{post} = 3.00, IQR_{post} = 2.25), and teamwork skills had the highest score (Mdn_{pre} = 4.00, IQR_{pre} = 0.93; Mdn_{post} = 4.48, IQR_{post} = 0.64). However, the most significant improvement was observed in analytical skills (Mdn_{pre} = 3.22, IQR_{pre} = 1.06; Mdn_{post} = 4.00, IQR_{post} = 0.89). While improvements were observed in all domains, improvements in participants' analytical, perseverance, teamwork, communication and global abstraction skills were more significant ($p < 0.05$), suggesting the effectiveness of the employed learning approaches in facilitating the medical students' generic skills development.

Keywords: *Generic skills, Medical students, Project-based learning, Active learning, Medical education elective blocks*

CORRESPONDING AUTHOR

Gisella Anastasia, Atma Jaya Catholic University of Indonesia, School of Medicine and Health Sciences, Pluit Campus. Jl. Pluit Raya No. 2, Penjaringan, Kec. Penjaringan, Jakarta Utara, Daerah Khusus Ibukota Jakarta 14440.

Email: gisella.gisella@atmajaya.ac.id

INTRODUCTION

Numerous advances in education and technology have driven remarkable progress in the healthcare field, initiating changes in healthcare delivery over the millennia. These developments demand that healthcare workers excel not only in field-related competencies but also possess generic skills required to meet societal expectations for high-quality healthcare. Generic skills such as effective communication, intra- and interprofessional

collaboration, leadership, teamwork and critical thinking are crucial in addressing the increasingly complex and diverse issues patients encounter (1). Moreover, these skills have been associated with successful roles in various medical responsibilities, including building stronger doctor-patient relationships, enhancing diagnostic accuracy and reducing perceived medical errors among physicians (2–4). Overall, these findings emphasise the importance of equipping medical students with a range of generic skills to meet the growing demands of the healthcare industry (5).

In 2006, the Indonesian Medical Council introduced the Standards of Competence for Indonesian Physicians, which were subsequently revised and evaluated in 2012 (6). According to these standards, physicians should excel in seven pillars of competence: noble professionalism, self-awareness and self-development, effective communication, information management, scientific foundation of medical knowledge, clinical practices and management of health issues. However, various generic skills, such as effective communication, teamwork, leadership and critical thinking (6), form the foundation for these competencies. Indonesian physicians are mandated to demonstrate generic skills as one of their core competencies. Consequently, medical education institutions in Indonesia adopted a competency-based medical education system in 2006, incorporating student-centred learning approaches, such as problem-based learning, skills laboratory, reflective writing and flipped classrooms (FCs), to nurture the aforementioned essential generic skills (7–11).

One of the learning approaches associated with the development of generic skills in higher education is project-based learning (PjBL). In PjBL, students engage in an active exploratory process that fosters knowledge, skills and attitudes by completing various tasks, typically done in groups, to finish a project (12). This approach is associated with the development of skills such as problem-solving, teamwork, effective communication and critical thinking (13). In addition, FCs and group mentoring learning are two other methods that support generic skills development through active learning. FCs, where the traditional classroom teaching model is reversed, emphasise practical knowledge application during class and encourage students to apply prior knowledge through discussions (14). This method promotes teamwork, communication and self-regulated learning skills (14, 15). On the other hand, group mentoring strengthens students' generic skills in creating a mentor-student relationship that provides students with personal support during their studies and necessary study guidance to help them succeed in their studies (16). Mentoring also strengthens students' sense of agency, which encourages them to be self-directed learners, and eases their transition into academic and professional roles (16–18).

Many notable studies are focusing on learning strategies that promote generic skills development in higher education (19–21). However, research focusing on learning strategies in medical education, particularly in Indonesia, is limited due to reasons such as unpublished studies, lack of research experts and research initiatives driven by financial interests that do not align with public needs (22). Hence, in this study, we aimed to assess the influence of various educational strategies—PjBL approach with FC and group mentoring—on the generic skills development of students enrolled in the medical education (ME) elective block at the School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia, Jakarta.

METHODS

Study Design and Setting

This quasi-experimental quantitative study, using a one-group pre-test post-test design, was conducted at the School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia, Jakarta. The medical course comprises a 4-year preclinical phase, followed by a 2-year clinical phase. At the beginning of the fourth year, the students were given the freedom to choose elective blocks according to their interests. Those enrolled in the ME elective block (n = 36) in September 2022 were invited to participate in the study. They were given an e-wallet balance (OVO) to take part in the research.

Intervention: ME Elective Block

The ME elective block was one of the few blocks in this school that employed a PjBL approach. The block's over-arching theme was "Health Equity through Education and Digital Technology". All the teaching and learning activities lasted for four weeks. At the end of the block, the students were expected to construct concrete and applicable ideas that can help reduce health disparities and achieve health equity in the real world. In addition, they were expected to evaluate ideas based on appropriate theoretical foundations, including learning theories (for projects aimed at empowering the community through educational activities), effective communication (both interpersonal and mass media communication), interprofessional collaboration and future thinking. The students were randomly divided into four project groups, with each group consisting of nine participants along with one or two mentors to assist with project development. The mentors were experienced lecturers and experts in the field of medical education (a minimum of five years of teaching experience). Since there were more female than male participants, we randomly assigned the male students first, followed by the female students into the groups.

Topics in the ME elective block

The ME elective block implemented the PjBL approach using several active learning methods, including working groups (mentoring sessions), FCs, workshops and team-building activities. To help the students develop their projects, several topics were included in their learning: Interprofessional collaboration, professionalism, adult learning, reflective writing, constructive feedback, inter-generational communication, collaborative and ethical communication in digital media, personal and community education and future thinking. Twelve of 17 contributors used active learning methods, contributing to 76 of 84 learning hours in this block. The contributors were experts in their respective fields, drawn from diverse disciplines such as communication, psychology, medical education and community organisation.

Active learning in the ME elective block

The PjBL activities were divided into three stages: planning, implementing and evaluating. In the planning stage (Week 1), each group was asked to identify any health disparity in one target community of their choosing, seek the underlying factor(s) that caused the disparity

and formulate an appropriate solution(s) based on future thinking and their role as agents of change (23). The students were also asked to incorporate elements of education and digital technology into their offered solution(s) and document everything in a proposal. Each proposal was then reviewed by at least two mentors, one of whom was the group's mentor, for necessary revisions before the implementation phase. The proposal included a problem statement and analysis, a proposed solution(s) and their rationale, a detailed education activity plan, an assessment plan and a budget.

Next is the implementation stage (Week 2 and Week 3). Here, each group prepared and conducted their proposed activity with the help of their mentor(s). The final stage is the evaluation stage (Week 4). Here, each group evaluated its project from multiple perspectives and generated a comprehensive project accountability report. At the end of the block, each group presented its project/activity report. The projects were assessed according to their fitness of purpose, creativity and innovation, logical and systematic thinking, critical thinking and problem-solving, collaboration initiative, application of theory and presentation skills.

What set this block apart from the other blocks in this medical school was the mentoring sessions. Before commencing the study, each mentor was briefed by the block team (medical education expert) on the block's learning outcome and expectations from the participants. The mentors were expected to provide theoretical knowledge and technical guidance necessary for project development in the healthcare field. In addition, they were asked to observe and provide constructive feedback on the participants' professional attitudes and behaviours. The mentors were given the freedom to schedule mentoring sessions with their group based on the individual group's needs; consequently, the amount and duration of mentoring sessions varied between each group in this block. On average, there were 14–15 meetings over 4 weeks that lasted for 28.5 hours.

Block assessment in the ME elective block

Formative and summative assessments were implemented in this block. The students were assessed formatively by their assigned mentor(s) during their working group activities and by other teachers during class activities. There were four summative assessments: group project proposal, group project report, 360-degree assessment and reflective writing. The group project assessments were evaluated by two assessors, including the group's mentor and a mentor from another group, using a predetermined rubric to ensure objectivity. This assessment consisted of document evaluation and presentation. Each group received feedback from the assessors during the presentation session. All group project proposals were assessed during Week 1, and project reports were assessed during Week 4. The 360-degree assessment was a peer group evaluation of the student's professional behaviour; specifically, each student was evaluated by all their group members and mentor(s). Reflective writing was another assessment aimed at assessing the student's affective domain. Each student was asked to reflect on their most memorable learning experience during the block; analyse the potential gap in their knowledge, skills and/or behaviour; and create an action plan to close that gap. Each mentor then arranged a one-on-one feedback session, around Week 2 and Week 3, to discuss the results of the 360-degree and reflective writing assessments with each mentee. The summary of the evaluations is provided in Figure 1.

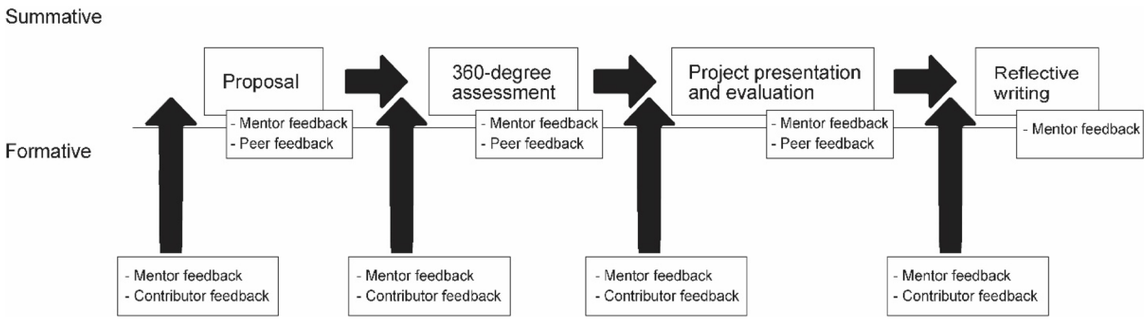

Figure 1: Assessment system in medical education elective block.

Objective and Outcomes

This quasi-experimental quantitative study, using a one-group pre-test post-test design, aimed to assess the influence of active learning approaches employed in the ME elective block on students' generic skills development. The students were asked to complete the Indonesian adaptation of the Generic Skills Self-Assessment questionnaire (24) at the beginning and end of the block. We hypothesise that using these active learning approaches in the ME elective block can improve the generic skills of fourth-year medical students at the School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia, Jakarta.

Generic skills self-assessment questionnaire

The Indonesian adaptation of the Generic Skills Self-Assessment (24) questionnaire consists of 33 statements grouped into 6 domains that are relevant in an active-learning context: analytical (9 items), perseverance (4 items), teamwork (7 items), communication (3 items), social judgement (2 items) and global abstraction (8 items). Each item was scored using a 5-point Likert scale, ranging from 1 to 5 (where 1 = This is a skill that definitely needs further training and 5 = I am fully capable of doing this) (24). This instrument has great internal consistency (Cronbach's alpha = 0.955) and good partial correlation (Kaiser–Meyer–Olkin = 0.849, $p < 0.001$).

Data Collection and Analysis

All participants completed the Indonesian adaptation of the Generic Skills Self-Assessment questionnaire right after the block's introduction (pre-test) and after the last block's activity (post-test). The participants provided informed consent and demographic data before completing the questionnaire. The Wilcoxon signed-rank test using IBM SPSS version 22 was performed to assess the influence of the educational strategies employed in the ME elective block on facilitating students' generic skills development, given the data was not normally distributed.

RESULTS

Participants' Demographic

Table 1 shows 35 (female = 30; male = 5; aged 20–22 years) of 36 fourth-year students enrolled in the ME elective block agreed to participate in the study, following all activities in the block, including pre- and post-test.

Table 1: Participants characteristic based on working group

Group	Characteristic (n = 35)	
	Gender, n (%)	
	Male	Female
A	1 (2.9)	8 (22.8)
B	2 (5.7)	7 (20.0)
C	1 (2.9)	7 (20.0)
D	1 (2.9)	8 (22.8)
Total	5 (14.4)	30 (85.6)

Descriptive Data

Overall, the participants showed improvement in all six domains of generic skills at the end of the block activities. Of these domains, the participants felt least capable of performing social judgement at the beginning (Mdn_{pre} = 3.00, IQR_{pre} = 1.50) and end of the block activities (Mdn_{post} = 3.00, IQR_{post} = 2.25) and most capable of performing teamwork at the beginning of the block activities (Mdn_{pre} = 4.00, IQR_{pre} = 0.93; Mdn_{post} = 4.48, IQR_{post} = 0.64). Analytical skills showed the most improvement at the end of the block activities (Mdn_{pre} = 3.22, IQR_{pre} = 1.06; Mdn_{post} = 4.00, IQR_{post} = 0.89). Detailed progression of participants' generic skills at the beginning and end of the ME elective block is presented in Table 2.

Table 2: Descriptive statistic of pre- and post-test results on generic skills

Domain	N	Minimum	Maximum	Median	IQR	Mean	Std. deviation
Analytical skills							
Pre-test	35	1.78	5.00	3.22	1.06	3.24	0.73
Post-test	35	2.44	5.00	4.00	0.89	3.99	0.66
Perseverance skills							
Pre-test	35	1.50	5.00	2.75	1.00	2.78	0.88
Post-test	35	1.00	5.00	3.25	1.50	3.25	1.00
Teamwork skills							
Pre-test	35	2.14	5.00	4.00	0.93	3.84	0.68
Post-test	35	2.86	5.00	4.43	0.64	4.37	0.57
Communication skills							
Pre-test	35	1.00	5.00	3.33	1.00	3.30	0.82
Post-test	35	2.33	5.00	4.00	0.83	4.05	0.71
Social judgement skills							
Pre-test	35	1.00	5.00	3.00	1.50	2.77	1.04
Post-test	35	1.00	5.00	3.00	2.25	2.94	1.38
Global abstraction skills							
Pre-test	35	1.38	5.00	2.88	0.56	2.96	0.74
Post-test	35	1.63	5.00	3.63	1.38	3.53	0.89

Data Analysis

The Wilcoxon signed-rank test was conducted to compare the pre- and post-tests statistically. Of the six domains, there was a statistically significant increase in the analytical (mean rank = 18.02, Z = –4.163, $p < 0.001$), perseverance (mean rank = 15.70, Z = –2.221, $p < 0.005$), teamwork (mean rank = 15.84, Z = –3.869, $p < 0.001$), communication (mean rank = 15.56, Z = –3.886, $p < 0.001$) and global abstraction skills (mean rank = 17.48, Z = –3.489, $p < 0.001$). Meanwhile, there was also an increase, although not statistically significant, in the participants' social judgement skills (mean rank = 15.25, Z = –0.522, $p > 0.05$).

Further analysis of each domain showed that some participants rated their generic skills higher at the beginning of the block, resulting in a negative rating difference in their post-test results. This was most apparent in social judgement and perseverance skills; precisely, 13 and 8 participants (25%–37%), respectively, rated themselves to have better social judgement and perseverance skills before attending the block's learning activities. Contrarily, only 3–4 participants (9%–11%) scored their communication and teamwork skills higher at the beginning of the ME elective block, as presented in Table 3.

Table 3: Comparison of pre- and post-test results on generic skills using the Wilcoxon signed-rank test

Generic skills domain	Ranks	Descriptive stats.			Wilcoxon test	
		n	Mean rank	Sum of ranks	Z	*p*
Analytical skills	Negative ranks	5	8.30	41.50	–4.163	< 0.001
	Positive ranks	27	18.02	486.50		
	Ties	3				
Perseverance skills	Negative ranks	8	16.88	135.00	–2.221	0.026
	Positive ranks	23	15.70	361.00		
	Ties	4				
Teamwork skills	Negative ranks	4	9.75	39.00	–3.869	< 0.001
	Positive ranks	25	15.84	396.00		
	Ties	6				
Communication skills	Negative ranks	3	15.00	45.00	–3.886	< 0.001
	Positive ranks	27	15.56	420.00		
	Ties	5				
Social judgement skills	Negative ranks	13	17.04	221.50	–0.522	0.602
	Positive ranks	18	15.25	274.50		
	Ties	4				
Global abstraction skills	Negative ranks	7	9.00	63.00	–3.489	< 0.001
	Positive ranks	23	17.48	402.00		
	Ties	5				

DISCUSSION

Active Learning Enhances Generic Skills in Students

The results of this study suggested that active learning approaches support the development of generic skills, particularly analytical, perseverance, teamwork, global abstraction and communication skills, in students. Although generic skills are occasionally informally acquired (20, 25), the evolving needs of society have driven the formalisation of the learning of these skills (19, 21). Studies have shown that generic skills are acquired more efficiently

through active learning (26–29) as opposed to teacher-centred approaches because acquiring these skills requires collaboration and interaction (30). Active learning immerses students in a dynamic and active environment that allows them to enhance their generic skills through real-time practice and application of the skills learned. These generic skills support the development of students' higher-order thinking skills, such as critical thinking, problem-solving and decision-making (26–29), as well as communication (26, 27), teamwork and interpersonal skills according to the activities (27, 28).

The active learning methods employed here included PjBL, FCs, workshops, team-building activities, and working groups (mentoring), each of which could enhance generic skills through its distinct pathways. For instance, FCs' inverted sequence of lectures and assignments (9, 31) enables students to engage with the course content at their own pace before the actual lecture, thereby optimising their time during the class (31). This method promotes the utilisation of higher-order thinking, communication and teamwork skills and encourages self-directed learning among students (9, 31–33). Another learning method was PjBL; engaging in PjBL fosters the enhancement of creativity, teamwork, organisation and managerial skills (34, 35). This is particularly pronounced in the context of group projects, where it plays a significant role in refining students' communication and collaboration proficiencies (34, 36). In addition, this method heightens their motivation and involvement (34, 36), potentially resulting in heightened perseverance. For participants who initially indicated elevated ratings for their generic skills, particularly in social judgement and perseverance, this suggests a potential link to a deficiency in professional experience, which may hinder a comprehensive self-assessment of their skills (35). This research also corroborates the assertion that diverse active learning methods are more effective in delivering generic skills education (29, 34).

Evaluating Generic Skills Assessment in the ME Elective Block

To enable the delivery of high-quality healthcare, healthcare professionals should demonstrate excellence not only in professional competencies but also in essential generic skills, such as effective communication, intra- and interprofessional collaboration, leadership, teamwork and critical thinking (1). In addition, recognising the escalating demands of the job market, higher education institutions have realised the need to integrate and cultivate generic skills within their curricular frameworks (19, 21, 25). In this research, we incorporated formative assessment strategies, such as feedback and self-assessment, within the mentoring process, alongside the utilisation of summative assessments. Utilising self-assessment as a tool to track the progress of generic skills development offers several advantages, such as increased awareness of their strengths and weaknesses; realising the purpose and value of generic skills and self-assessment; and monitoring their development (25). Making generic skills explicit in self-assessment informs students about the significance of these skills in their career development (25) and prevents them from overlooking the importance of cultivating such skills (37).

In the ME elective block, we conducted project evaluations, reflective writing and 360-degree assessment as summative assessment. All these were evaluated using an assessment rubric, including components that specifically encompass generic skills. For instance, in project assessment, we appraised their creativity and innovation, critical thinking and problem-solving, theory application, suitability of facilities/media used, project evaluation and collaborative and presentation skills. When evaluating reflective writing, we considered aspects such as organisation, presentation, depth, content and point of view expressed. In the 360-degree assessment, we used a professionalism assessment based on Crow's study,

which includes the evaluation of dignity and integrity, responsibility and accountability, leadership, altruism, caring, compassion, communication, excellence, scholarship and respect for others (38). The assessment rubric revealed enhancements in specific generic skills in this study, particularly in analytical, perseverance, teamwork, global abstraction and communication skills.

The findings suggested that the ME elective block failed to improve students' social judgement. The low score in the social judgement domain could be attributed to the students' hesitation to express their judgement due to fear of disrupting the existing cooperative learning environment (39, 40). It is noteworthy that this situation is more apparent in Eastern societies, such as Asia, where social harmony and stability are often prioritised (41, 42). Eastern cultures generally encourage people to convey their candid opinions exclusively in private rather than in public settings. In addition, people are wary of any emotional expression that may disrupt the prevailing harmony. This cultural orientation extends to the sharing of thoughts, feelings and emotional experiences with others (41–43). Unlike the other domains, social judgement is not explicitly incorporated into the medical education syllabus; hence, the development of this skill is not formally facilitated. However, students can learn social judgement skills informally through social engagement during group learning activities, such as working group sessions. One practical form of social judgement skill manifests in students' ability to provide technical critiques. Considering that active learning, which is the foundation of the ME elective block, positively influences students' ability to provide technical critiques (36) and the fact that students' social judgement skills remained low at the end of the block, further investigation to uncover the challenges in facilitating the development of this particular skill is warranted.

Role of Mentors in Facilitating Students' Generic Skills Development

Incorporating generic skills into the assessment necessitates guiding students in comprehending the assessment rubric and work guidelines. Mentors are anticipated to be familiar with the expectations outlined in the assessment rubric and conduct individual observations to offer personalised feedback concerning the expected knowledge, skills and attitudes of the group members. Mentoring assists students in enhancing their generic skills through the provision of feedback and guidance (7, 28, 44), particularly focusing on the achievement of learning objectives (34, 36) as a role model (28). Feedback is essential in facilitating personal and professional development, with mentors acting as gatekeepers to articulate expectations, assess individuals against those standards and collaboratively devise plans for improvement (45–47). Working groups facilitated by mentors serve as a platform for both mentors and students to engage in self-assessment and offer feedback. Through this approach, students gain an awareness of the expected generic skills and their relevance in the role of doctors. The process entails evaluating their current generic skill set, recognising both strengths and weaknesses and actively tracking their ongoing development (25, 46).

Limitations

This study has a limited scope; it concentrated solely on a specific location and a particular student level, restricting its generalisability to other areas or populations. Future research should therefore expand to diverse levels and locations. The disparities observed between the generic skills outlined in the assessment rubric and those evident in the pre- and post-test suggest an area for improvement in future research. There is also potential for further investigation to harmonise these generic skills for greater consistency. A qualitative

methodology to explore the factors contributing to the enhancement of generic skills in active learning is also recommended for future investigations.

CONCLUSION

Diverse active learning methods, such as PjBL, FCs, working groups and mentoring, significantly improved the students' generic skills—analytical, perseverance, teamwork, global abstraction and communication. These findings are consistent with prior research, indicating that immersion in dynamic and active learning environments fosters higher-order thinking skills, such as critical thinking, global abstraction, communication, teamwork and interpersonal skills. Our findings also highlighted the importance of incorporating the intended generic skills into the formal curriculum. Simultaneously, it is essential to acknowledge the study's limitations, and future studies should consider expanding their scope. In addition, a qualitative approach is recommended for investigating the factors contributing to the improvement of generic skills in active learning. Overall, the study provides valuable insights into the ongoing discourse on practical pedagogical approaches to enhance generic skills among students.

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ETHICAL APPROVAL

An ethical clearance certificate (certificate no: 01/04/KEP-FKUAJ/2022) was obtained from the Research Ethics Committee School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia, on 7th April 2022.

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