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RESEARCH ARTICLE

Learning Styles and Career Choice among Vocational Students in Heavy Equipment Repair

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ARTICLE INFO	ABSTRACT
Received: Mar 21, 2025	This study explores how learning styles influence career choices among
Accepted: May 17, 2025	vocational students in Mongolia, focusing on heavy equipment repair students. We surveyed 158 students from four Technical and Vocational Education and
	Training (TVET) schools, all following the Competency-Based Learning
Keywords	Curriculum (CBLC). Results show that 84.8% of students independently chose their profession, with 87.3% intending to work in the field after graduation.
Learning Style	The 'Reflector' learning style was predominant (69.62%) and associated with
Competency-Based	higher academic performance. By comparing Kolb's Experiential Learning
Curriculum	Cycle with the CBLC, we identified shared elements that may shape students'
Choice of Profession	learning preferences. These findings suggest that tailoring teaching methods
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INTRODUCTION

The TVET (Technical and Vocational Education and Training) sector, which primarily serves young people, is undergoing significant reforms aimed at meeting both labor market demands and student expectations. Since 2014, Mongolia's TVET sector has implemented a Competency-Based Learning Curriculum (CBLC)(Undrakh Ts., 2012). Starting in 2017, students have been required to pass an independent examination prior to graduation, verifying their mastery of all competencies outlined in the CBLC(The Ministry of Education, Study report of Technical, Vocational Education and Training sector., 2019). However, during the 2022 consultation meeting on "Vocational Education, Training, and Cooperation with Employers," it was revealed that 60 percent of graduates holding vocational qualifications did not meet employer expectations(L., 2022). This raises the question: Could employer dissatisfaction with vocational graduates be partly due to students pursuing careers that do not align with their interests or aptitudes?

To explore this possibility, we aimed to investigate whether learning style influences career choice and future professional development. For this study, we applied Kolb's Learning Style Inventory, a psychological framework used to assess individual learning preferences. Our sample consisted of heavy equipment repair students enrolled in a program based on the CBLC approved in 2019.

To examine the relationship between learning style and career choice, we employed both survey testing for data collection and statistical methods for data analysis. A total of 158 heavy equipment repair students participated in the survey. First, we identified their learning styles. Then, we analyzed the correlation between their learning styles and the way they chose their careers. Finally, we examined the relationship between their career choices and their willingness to work in a profession aligned with their dominant learning style.

Therefore, this study aimed to determine whether learning style influences career choice and future professional development. We applied Kolb's Learning Style Inventory as the psychological

framework for identifying students' learning preferences. Our participants were heavy equipment repair students enrolled in a program based on the Competency-Based Learning Curriculum (CBLC) approved in 2019.

To explore the relationship between learning styles and career choice, we collected data using a structured survey and analyzed the results using statistical methods. A total of 158 heavy equipment repair students participated in the survey. First, we identified their dominant learning styles. Then, we analyzed the correlation between their learning styles and their career choice. Finally, we examined the relationship between their chosen careers and their willingness to work in a profession aligned with their dominant learning style.

The 2021 report *Determining Current and Future Job Demand and Needs in Mongolia's Labor Market* highlighted that 75.5 percent of TVET graduates hold vocational qualifications. The majority of these graduates are trained in fields related to industry, construction, and transportation (Protection, 2019). Based on this context, we selected the Competency-Based Learning Curriculum (CBLC) for the Heavy Equipment Repairer program—one of the 28 professional model curricula developed under the "Competency-Based Training" project of the Mongolian Millennium Challenge Fund (Labour Ministry order appendix, 2015).

Competency-based education is a growing trend aimed at bridging the gap between education and the labor market. This approach aligns with David Kolb's experiential learning theory, as discussed by Martin Mulder and Jonathan Winterton (Martin Mulder, 2017).Kolb proposed that effective learning occurs through a four-stage cycle: (1) concrete experience, (2) reflective observation, (3) abstract conceptualization, and (4) active experimentation (Kolb, 2013). He emphasized that learners gain knowledge by actively engaging in each stage of this cycle.

To make Kolb's model more accessible and practical, Honey and Mumford adapted it into a simplified framework for identifying individual learning styles. They proposed that learners adopt four roles at different stages of the learning cycle: reflector, activist, theorist, and pragmatist. Training for adults and young adults typically begins with a concrete experience, during which the learner plays an active role. This is followed by reflection, theoretical analysis, and finally, practical application. This cycle of experiential learning is continuous and dynamic (Kolb, *Learning Styles and Learning Spaces: Enhancing Experiential Learning in Higher Education*, 2006).

METHODOLOGY

The competency-based learning process in TVET aligns closely with Kolb's experiential learning cycle. In competency-based education, learners are introduced to tasks and gain initial exposure to real-world activities, typically through demonstrations or structured practice under supervision. After practicing these skills, learners reflect on their performance, identifying strengths and areas for improvement, often with feedback from instructors or peers. In the next stage, they connect practical experience to theoretical knowledge, developing an understanding of the underlying principles, rules, and frameworks that guide their tasks. Finally, learners apply their newly acquired knowledge and skills to more complex or varied tasks, often in new or simulated work environments.

This four-stage process is repeated with the introduction of each new competence, mirroring Kolb's experiential learning cycle. Therefore, we aligned the stages of competency-based learning with Kolb's cycle, as illustrated in Table 1, to explore how these stages correspond to students' learning styles.

No	Competence-Based Learning Stage	Kolb's Experiential Learning Cycle
1.	Skill Demonstration	Concrete Experience
2.	Skill Practice and Feedback	Reflective Observation
3.	Knowledge Integration	Abstract Conceptualization
4.	Application in New Contexts	Active Experimentation

Table 1. Matching competence-based learning stages with Kolb's learning cycle

Each stage of Kolb's experiential learning cycle corresponds to one of his four learning styles: Diverger (Concrete Experience), Assimilator (Reflective Observation), Converger (Abstract

Conceptualization), and Accommodator (Active Experimentation). These learning styles also align with those in the Honey and Mumford model, as outlined by Muñoz-Seca(Munoz-Seca, 2003), and illustrated in Table 2. Honey and Mumford's framework presents learning styles as a continuum, suggesting that individuals may move through different styles over time. However, most people eventually develop a preference for one or more dominant styles.

No	Kolb	Honey and Mumford
1.	Diverger	Reflector
2.	Assimilator	Theorist
3.	Converger	Pragmatist
4.	Accomodator	Activist

By aligning competency-based learning with Kolb's experiential learning cycle, we establish a structured framework that effectively supports both skill acquisition and knowledge development in TVET education. This alignment ensures that learners progress through stages of hands-on experience, reflection, conceptual understanding, and active experimentation, thereby systematically reinforcing their competencies.

Sample and Data Collection

At the end of 2023, we conducted a survey of 568 students from four TVET institutions: South Gobi Polytechnic College (SGPC), Building Technology College (BTC), Mining and Energy Polytechnic College (MEPC), and the Polytechnic College of Technic and Technology (PCTT). These institutions were selected for their representation of three key regions in Mongolia, each specializing in one of the country's dominant industries—mining, tourism, and agriculture.

Out of the total surveyed population, 158 students approximately 28% of all heavy equipment repair students participated in the study, providing a representative sample of this vocational group. Among the respondents, 43% were from SGPC, 25% from PCTT, 19% from BTC, and 13% from MEPC. The demographic characteristics of the participants are presented in Table 3.

	TVET school							Total		
Survey takers		SGPC		BTC		РСТТ		MEPC		%
		Freq.	%	Freq.	%	Freq.	%	Freq.	%	
Condor	Male	65	41.1	40	25.3	29	18.3	20	12.7	97.5
Genuer	Female	3	1.9	0	0	1	0.63	0	0	2.5
	14-15	22	13.9	17	10.9	12	7.6	0	0	32.3
Age	16-18	43	27.2	23	14.6	17	10.8	20	12.7	65.2
	20-21	3	1.9	0	0	1	0.63	0	0	2.5
Land of	1st	31	19.7	21	13.3	14	8.9	0	0	41.8
Level OI	2nd	20	12.7	15	9.5	13	8.2	7	4.4	34.8
study	3rd	17	10.8	4	2.5	3	1.9	13	8.3	23.4
Total freq.		68		40		30		20		

Table 3. Demographic factors of survey takers

We employed the Honey and Mumford Learning Styles Questionnaire, which is grounded in Kolb's experiential learning theory and consists of 80 items. Each "yes" response is awarded one point, and the total score indicates the respondent's dominant learning style. Based on the item numbers to which participants responded "yes," learning styles were categorized as follows: Activist (items 2, 4, 6, 10, 17, 23, 24, 32, 34, 38, 40, 43, 45, 48, 58, 64, 71, 72, 74, 79), Reflector (7, 13, 15, 16, 25, 28, 29, 31, 33, 36, 39, 41, 46, 52, 55, 60, 62, 66, 67, 76), Theorist (1, 3, 8, 12, 14, 18, 20, 22, 26, 30, 42, 47, 51, 57, 61, 63, 68, 75, 77, 78), and Pragmatist (5, 9, 11, 19, 21, 27, 35, 37, 44, 49, 50, 53, 54, 56, 59, 65, 69, 70, 73, 80).

As each learning style has a maximum possible score of 20, we defined the following ranges to indicate a very strong preference:

Activist: 13–20

Reflector: 18-20

Theorist: 16–20

Pragmatist: 17-20

Descriptive statistics and ANOVA tests were conducted for each learning style. The survey also included questions regarding whether students had chosen their profession independently. This aimed to explore the relationship between autonomous career choice, willingness to work in the field after graduation, and individual learning styles.

Analyzing of Data

After processing the questionnaire data, the number of students corresponding to each learning style was determined. The most common learning style among the respondents was Reflector (n = 110, 69.62%), followed by Activist (n = 20, 12.66%) and Pragmatist (n = 18, 11.39%). The least common was Theorist (n = 10, 6.33%). Table 4 presents the distribution of learning styles along with the average grade point averages (GPAs) of students from each TVET institution. The data show that students with a Reflector learning style achieved the highest average GPA (90), while GPA differences among the other three learning styles were relatively minor.

TVET	Activist		Pragmatist		Reflector		Theorist		Avorago
school	Freq.	GPA	Freq.	GPA	Freq.	GPA	Freq.	GPA	GPA
BTC	7	71	3	88	27	79	3	73	78
SGPC	9	77	9	70	48	80	2	56	77
РСТТ	3	70	4	77	19	81	4	84	80
MEPC	1	93	2	92	16	90	1	97	91
Freq.	20	75	18	77	110	81	10	76	80

Table 4. Relation between learning style and GPA

Although the overall correlation between learning style and academic achievement is weak, Table 5 shows that this relationship is more pronounced among students with the Reflector learning style.

Table 5. Learning style correlation with GPA

	Reflector	Pragmatist	Theorist	Activist
Correlation with GPA	0.17309	0.08366	0.05922	-0.124

According to the descriptive statistics of GPA by learning style, as presented in Table 6, students with the Reflector learning style have the highest average GPA of 81.39 and the lowest standard error, indicating an adequate sample size. In contrast, students with the Activist learning style have the lowest mean GPA of 74.55, accompanied by a positive skewness, which suggests that the grade distribution is skewed to the left. Furthermore, the confidence interval for the Reflector group is 1.96, indicating that their GPA distribution closely approximates a normal distribution.

Table 6. Descriptive Statistics of GPA

	Reflector	Pragmatist	Theorist	Activist	Total
Mean	81.39	77.19	76.38	74.55	79.73
Standard Error	0.99	3.52	4.7	2.06	0.9
Median	80	80	75	72.5	80
Mode	80	70	70	70	70
Standard Deviation	10.35	14.93	14.87	9.23	11.32
Sample Variance	107.07	222.86	221.09	85.1	128.23
Kurtosis	0.43	5.72	-0.98	-0.53	1.74
Skewness	-0.52	-1.62	-0.12	0.09	-0.73
Confidence Level (95.0%)	1.96	7.42	10.64	4.32	1.78

Table 7 shows the correlation between learning style and grade point average (GPA) across the vocational schools. The F-statistic for GPA variance among the colleges is 5.54, with a p-value of 0.0197, indicating a statistically significant difference in GPA between institutions. In contrast, the F-statistic for GPA variance across learning styles is 0.43, with a p-value of 0.735, suggesting no significant difference in GPA among the various learning style categories.

Source of Variation	SS	DF	MS	F	P-value	F crit.
Colleges	1054.3	3	351.417	5.53654	0.01973	3.862548
Learning styles	82.25	3	27.4167	0.43195	0.73527	3.862548
Error	571.25	9	63.4722			
Total	1707.8	15				

 Table 7. ANOVA test with Two-Factor Without Replication

The Reflector learning style is the most prevalent among students and exhibits a stronger correlation with GPA compared to other learning styles, suggesting a potential relationship between learning style and academic performance. Additionally, the descriptive statistics for the Reflector group indicate that their confidence interval closely approximates a normal distribution.

RESULTS

The analysis of students' learning styles reveals clear variations across different educational levels. As students advance to higher levels, there is a noticeable increase in the proportion of those exhibiting a Reflector learning style. Conversely, the percentages of students identified as Theorists and Activists decline, indicating potential shifts in learning preferences as students progress. Notably, no students demonstrate the Theorist learning style at the third level, as shown in Figure 1. Meanwhile, the proportion of students with a Pragmatist learning style varies slightly across levels, suggesting a dynamic relationship between learning style and academic progression. These trends offer valuable insights into how students' learning preferences evolve throughout their educational journey.



Figure 1. Learning style by level of study.

As illustrated in Figure 2, grade distributions vary across different learning styles. Most students with an Activist or Pragmatist learning style tend to earn B or C grades. In contrast, the grade distribution for students with a Theorist learning style is evenly spread across all grade categories. A significant proportion of students with a Reflector learning style achieve A and B grades, with only a slight presence of C grades. These patterns suggest a potential relationship between learning styles and academic performance.



Figure 2. The grade distribution of all students across learning styles

Figure 3 shows that 94.4% of students with the Pragmatist learning style independently chose the heavy equipment repair profession, while only 82.7% of Reflector students made their own choice the lowest percentage among all learning styles. The percentages for the other two learning styles ranged between 85% and 90%. This suggests that students with a more practical learning approach may be more likely to make autonomous career decisions, whereas those with a reflective style might require greater external guidance when choosing their careers.



Figure 3.Student choice of profession

The grade distribution of students who independently chose their profession shows notable variations across learning styles, as illustrated in Figure 4. Among students earning an A grade, 16.4% are Reflectors, while only 1.49% each are Pragmatists and Theorists, and 0.75% are Activists. For those receiving a B grade, the distribution includes 32.1% Reflectors, 5.79% Pragmatists, 4.48% Activists, and 2.24% Theorists. Students awarded a C grade consist of 16.4% Reflectors, and 5.22% each Activists and Pragmatists, with 1.49% Theorists. Lastly, among students with a D grade, 2.99% are Reflectors, 2.24% Activists, and 1.49% Theorists.



Figure 4. Grade distribution across learning styles of students who choose profession independently.

Figure 5 illustrates students' positive responses to three key questions: whether they independently chose their profession, their willingness to work in the field after graduation, and their intention to pursue career development. Among students with Activist and Pragmatist learning styles, the percentage who independently chose their profession is 15% and 11% higher, respectively, than those willing to work in the field after graduation. For Activist students, the intention to pursue career development is 5% lower than their independent career choice, but 5% higher than their willingness to work in the profession. In contrast, Pragmatist students show a 28% decrease in career development intention compared to their independent career choice, and a 17% decrease compared to their willingness to work in the profession.



Figure 5. Students choice of profession, willingness to work in a profession, and intention to career development across learning styles

For students with a Reflector learning style, the percentage willing to work in their field after graduation is 7% higher than those who independently chose their profession. In contrast, this percentage remains unchanged for students with a Theorist learning style. Among Reflector students, the intention to pursue career development is 3% higher than their independent career choice, but 7% lower than their willingness to work in the profession. For Theorist students, the intention for career development is 10% lower than both their independent career choice and their willingness to work in the field.

DISCUSSION

The results show that Reflectors make up the majority (69.62%) of surveyed TVET students, while Activists (12.66%), Pragmatists (11.39%), and Theorists (6.33%) are considerably less represented. This suggests that vocational education in heavy equipment repair may naturally attract or better support students who prefer careful observation, reflection, and structured learning experiences. The low proportion of Theorists may indicate that students who favor abstract thinking and theoretical frameworks find TVET programs less appealing, or that the current curriculum does not adequately cater to their learning preferences.

Given their predominance, it is not surprising that Reflectors also achieve the highest academic performance, with the largest proportion of A and B grades. Their tendency to analyze information thoroughly before taking action likely aligns well with structured learning environments, supporting their success in both theoretical and applied coursework.

In contrast, Activists, Pragmatists, and Theorists tend to perform less well, with relatively few earning top grades. Activists, who thrive on immediate engagement and hands-on activities, may find traditional academic assessments challenging. Pragmatists, who prefer learning through practical application, might struggle with abstract or theory-heavy subjects. Meanwhile, Theorists may not receive sufficient structured conceptual instruction to excel. These findings suggest that the current curriculum may be better suited to Reflectors, while offering fewer tailored learning opportunities for students with other styles.

The differences in career choices and development intentions among learning styles offer valuable insights:

Activists and Pragmatists are more likely to independently choose their profession, reflecting a strong initial interest in hands-on, application-oriented learning. However, their lower intention for long-term career development suggests they may not perceive clear pathways for growth in their chosen field. This disconnect could stem from limited industry exposure, unclear advancement opportunities, or dissatisfaction with conventional educational approaches.

Reflectors demonstrate greater career stability, with more students expressing a willingness to work in their field after graduation than those who initially chose it. Their thoughtful and analytical approach may lead to a deeper commitment and a more informed understanding of their career path over time.

Theorists show consistent career intentions, but their low representation indicates that current TVET programs may not effectively engage students who prefer conceptual, theory-driven learning.

CONCLUSION

This study examined the dominant learning styles of heavy equipment repair students across four vocational schools to explore the relationship between learning styles, career choice, and willingness to work in their chosen profession.

The findings indicate that the predominant learning style among these students is Reflector, with its prevalence increasing from 63.6% at the entry level to 78% at the graduation level. The proportions of Pragmatist and Activist learning styles remain relatively stable across all three levels, while the Theorist style declines steadily and disappears entirely at the graduation level. The decrease in *Activist* learners and the concurrent rise in *Reflectors* from the first to the second level aligns partially with Honey and Mumford's learning style progression: $Activist \rightarrow Reflector \rightarrow Theorist \rightarrow Pragmatist$. However, the expected increase in *Pragmatist* learners at the final stage does not occur, even as *Theorist* learners disappear. This deviation from the expected transition pattern suggests a possible misalignment between Kolb's experiential learning cycle and the evolving learning preferences of students as they progress. Further research is needed to examine how specific elements of the Competency-Based Learning Curriculum (CBLC) and instructional methods might influence these trends.

Academic performance across institutions also shows statistically significant variation, with an F-statistic of 5.54 and a p-value of 0.0197. However, differences in GPA among the various learning style groups are not statistically significant (F = 0.43, p = 0.735). Among students who independently selected their profession, only those with the *Reflector* learning style show a slight increase (2.8%) in willingness to work in their chosen field after graduation. In contrast, students with other learning styles show an average decrease of 15.9%, with *Pragmatists* experiencing the steepest decline at 27.7%.

Despite the career-oriented nature of vocational education, interest in long-term career development declines across all learning styles compared to the initial desire to work in the field. Nevertheless, among students who chose their career independently, both willingness to work in their field (89.5%) and intention for continued career development (84.3%) remain high, suggesting a strong commitment and thoughtful career decision-making.

The initial research question—whether employer dissatisfaction with the competencies of graduates may stem from students choosing a profession that does not suit them—was not supported by the findings. Future research should investigate the alignment between employer expectations and student learning outcomes as defined in the CBLC to better understand potential gaps and inform curriculum improvement.

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