

Development-Oriented Financial Aid and Core Competency Improvement for Impoverished Students in Chinese Pharmacy Higher Education

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Abstract

Students from low-income families represent a vulnerable population in higher education that demands attention. Pharmaceutical universities globally must establish robust financial aid initiatives to support the growth and achievement of economically disadvantaged learners. In China, institutions have actively experimented with subsidized education models, achieving notable progress alongside certain challenges that offer valuable insights. This research suggests an approach to elevate the core competencies of underprivileged pharmacy students within a development-focused aid framework. The investigation focused on clinical pharmacy undergraduates from a specialized pharmacy institution as participants. A sequential explanatory mixed-methods design was adopted, involving initial quantitative data via questionnaires, followed by qualitative insights from semi-structured interviews. Information from both phases was merged and analyzed statistically.

The survey produced 397 valid responses, predominantly from females (73.8%), mostly undergraduates (89.67%), and originating from rural regions (73.81%). Five respondents took part in subsequent in-depth interviews. Integrated findings revealed: (a) financial support—high satisfaction levels among recipients regarding monetary aid; (b) psychological aid—interviewees largely indicated that scholarships markedly boosted their self-esteem and drive; (c) academic mentoring—aid recipients expressed distinct career goals and a pronounced demand for advanced professional training; and (d) career support—many sought targeted guidance on job planning and professional pathways. Financial aid programs in pharmacy higher education institutions should be expanded to alleviate the economic concerns of disadvantaged clinical pharmacy students via direct funding, foster ethical development through mental health support, enhance general knowledge and scientific proficiency, and build theoretical and hands-on skills via instructional guidance. By embedding employment support within pharmacy curricula, the professional capabilities of clinical pharmacy graduates can be strengthened, thereby advancing reforms in tertiary pharmacy education and raising the standard of pharmaceutical talent cultivation.

Keywords: Development-focused aid system, Pharmacy higher education institutions, Economically disadvantaged students, Core competencies, Improvement strategies

Introduction

Financial support plays a critical role in the progress and training of pharmacy students in higher education settings. Such assistance is essential for enabling low-income university students to complete their degrees

successfully, develop key abilities, and contribute meaningfully to society. It further promotes educational equity and helps interrupt intergenerational poverty [1]. The development-oriented aid system marks a major advancement in China's university student support structure. This model evolves from prior stages centered on basic subsistence and crisis relief, now featuring greater precision and varied aid formats. Beyond simple grants, it incorporates scholarships, loans, campus jobs, and additional measures to address multifaceted student requirements and promote comprehensive growth. First, aid recipients are increasingly selected based on need: starting in 1949 with full tuition exemptions for everyone

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[2], then shifting by 1955 to partial scholarships for select groups, progressively focusing on those facing financial hardship [3]. Second, aid types have diversified: in 1986, the State Council advocated replacing uniform people's scholarships with a mix of awards, loans, and work opportunities [4]. By 1999, the Industrial and Commercial Bank of China was tasked with managing loans to cover tuition and living costs for needy students [5]. Subsequent policies in 2004 [6] and 2007 [7] refined the framework, creating a broad system of scholarships, bursaries, loans, work-study options, and fee reductions tailored to students' economic status and developmental needs.

Third, the focus has shifted toward whole-person development, addressing non-material aspects [8]. In 2019, the Ministry of Education's Party Group released guidelines stressing the fusion of "material aid," "academic nurturing," and "motivational support" to

build an integrated system combining financial help with educational enhancement [9].

The concept of "core literacy" operationalizes the idea of well-rounded human development [10]. As defined by UNESCO, it encompasses the vital competencies needed for individuals to achieve personal goals and participate productively in society [11], equipping them for an uncertain, future-driven environment [12].

In pharmaceutical studies, medical progress directly impacts public health. For clinical pharmacy specifically, drawing from the 2023 Expert Consensus on the Core Literacy Framework for Clinical Pharmacists in China—developed by the Chinese Medical Foundation of the United States and the Specialty Committee of Pharmacy Disciplines under the China Hospital Association [13]—the core competencies for Chinese clinical pharmacy majors are outlined in **Table 1**.

Table 1. Framework of core literacy for Chinese clinical pharmacy students

Indicators	
Primary indicators	
Core literacy	
Knowledge and skills	• Fundamental theoretical foundations and expertise in clinical pharmacy • Understanding of fields interconnected with clinical pharmacy • Essential practical competencies for clinical pharmacy work
Abilities	• Critical thinking and analytical reasoning abilities • Effective interpersonal and communication abilities • Skills in leadership and organizational management • Ability to exert positive influence • Competence in ongoing self-enhancement • Ability to engage in lifelong learning
Professionalism	• Sense of civic responsibility and social ethics • Adherence to professional moral standards • Commitment to professional duties • Spirit of selfless dedication • Awareness of identifying and preventing risks to patients
Secondary indicators	(No further sub-items specified in the original)

Core literacy is composed of three interrelated dimensions: knowledge, skills, and professional qualities. Knowledge constitutes the foundational element for the formation and advancement of literacy; only through continuous knowledge accumulation can learners internalize information and elevate their cognitive capacity to more advanced levels. Skills function as the applied carriers of literacy, as competencies can only be fully acquired through the practical application of knowledge. Abilities represent the external expression of literacy and include interpersonal communication skills as well as the capacity for interdisciplinary and cross-sector collaboration [14], reflecting the psychological mechanisms that regulate cognitive activities [15]. Professional qualities refer to the integrated attributes

displayed throughout an individual's career development, including basic civic ethics, personality cultivation, work discipline, professional conduct, commitment awareness, and humanistic literacy.

In examining whether university financial aid effectively contributes to the development of students' core literacy, prior studies have identified multiple challenges. These include non-standardized identification processes and low funding coverage ratios [16], underscoring the need to enhance the accuracy of funding distribution [17]. Other concerns involve overly limited funding channels [18], insufficient financial assistance for students in extreme poverty to cover higher education costs [19], suboptimal policy implementation and execution outcomes [20], restricted effectiveness in certain institutions [21], and inadequate attention to the influence

of financial aid on learning and employment due to data constraints [22]. Notably, financial support specifically targeting pharmaceutical students within universities has received very limited scholarly attention.

To systematically respond to these issues, this study used clinical pharmacy students from a pharmaceutical university as a representative case by conducting questionnaire surveys and interviews. The objective was to examine the real-world implementation of financial aid policies in pharmaceutical universities and to analyze the assistance needs of impoverished students in relation to core literacy development. On this basis, targeted optimization strategies are proposed.

Materials and Methods

An explanatory sequential mixed-methods design was adopted for this research. In the first phase, quantitative data were collected through questionnaire surveys administered between August and October 2023 to assess students' perceptions and experiences related to financial assistance and core literacy development. In the second phase, qualitative focus group interviews were carried out from March to May 2024 to provide an in-depth interpretation of the quantitative findings. Participants were drawn from a pharmaceutical specialty university located in Jiangsu Province, China.

Participants and procedure

This university was selected as the research site because it is directly affiliated with national ministries and commissions and enrolls students from across the country. Compared with regional institutions, its population of subsidized students is more diverse and representative, enhancing the generalizability of the findings. Furthermore, the university has established a comprehensive funding system comprising scholarships, grants, student loans, and work-study programs, offering a suitable practical context for evaluating and refining financial aid policies.

Students eligible for participation were clinical pharmacy majors who had received financial assistance at China Pharmaceutical University between 2020 and 2023. To protect confidentiality regarding students' economic conditions and funding status, online questionnaires were distributed privately to eligible participants through class counselors. Participation was voluntary and anonymous, and students were clearly informed that their academic standing would not be affected by their involvement. All

results were reported in aggregated form and used exclusively for academic research purposes.

Quantitative component

Data measurement

A questionnaire tailored to the characteristics of clinical pharmacy education was developed to assess the overall status of university financial aid and students' developmental needs. All respondents were required to meet the following criteria: enrollment between 2020 and 2023, a major in clinical pharmacy, and receipt of financial assistance for more than six months after enrollment. Prior to the formal survey, five senior experts from the university-level funding center were randomly selected for interviews to clarify funding practices, refine questionnaire content, and provide expert feedback. Additionally, a pilot test was conducted with 10 randomly selected funded students; ambiguous items were revised to enhance clarity, comprehension, and reliability. Ultimately, the "Questionnaire of Students from Low Socioeconomic Families in Chinese Pharmaceutical Colleges and Universities" was finalized. The instrument consisted of 30 items organized into three sections: demographic characteristics, understanding and evaluation of university funding operations, and demands related to quality development.

Data analysis

SPSS version 27.0 was applied for data processing and statistical analysis. Descriptive statistics, including frequencies and percentages, were calculated. Chi-square tests were performed to examine differences in responses between groups, such as gender and place of residence. Statistical significance was defined as a two-sided p-value below 0.05.

Qualitative component

Data collection

In-person semi-structured interviews were carried out using the "Interview Outline of Students from Low Socioeconomic Families in Pharmaceutical Colleges and Universities in China" developed by the research team. An interview guide was formulated, comprising a series of semi-open-ended questions covering four domains: economic conditions, academic status, financial support experiences, and future development needs. The interview outline was closely aligned with the questionnaire and served to cross-validate the quantitative findings. Prior to data collection, all

interviewers underwent standardized training to ensure uniformity in the interview procedures.

Data analysis

With participants' informed consent, all interviews were audio-recorded and transcribed verbatim. Particular attention was paid during transcription to preserve the authenticity of participants' expressions. The transcripts were reviewed and discussed jointly by interviewers and transcribers to ensure accuracy and transparency. Subsequently, interview data were organized and summarized according to the interview framework to generate structured thematic content, thereby enhancing the systematic nature and analytical depth of the qualitative analysis.

Results and Discussion

Among the participating students (N = 563), 399 (70.87%) completed the questionnaire, and 5 took part in interviews. After excluding questionnaires with more than one missing item, incomplete responses, or uniform answer patterns, 397 valid questionnaires remained, yielding an effective response rate of 99.5%. The majority of respondents were female (73.80%), predominantly from non-urban areas (73.80%), and mainly non-only children (72.04%).

The proportion of family members who had attained higher education was relatively low. Although China's gross higher education enrollment rate has surpassed 60% [23], indicating entry into a new phase of mass higher education, **Table 2** demonstrates that only 39.55% of parents or siblings of impoverished students had received higher education. This finding suggests that the educational attainment of families with impoverished students remains below the current national average.

Table 2. Characteristics of the sample population (N = 397)

Characteristics	N (%)
Participant Gender	
Male	104 (26.20)
Female	293 (73.80)
Grade	
Freshman	118 (29.72)
Sophomore	154 (38.79)
Junior	38 (9.57)
Senior	46 (11.59)
Graduate student	41 (10.33)
Home location	
Countryside	183 (46.09)
County seat or township	110 (27.71)
Urban area	104 (26.20)
Family members	
Only child	111 (27.96)
One sibling	198 (49.87)
Two siblings	60 (15.11)
Three or more siblings	28 (7.05)
Whether parents or siblings have received higher education	
Yes	157 (39.55)
No	240 (60.45)
Whether there are college students in the family of close relatives	
Yes	320 (80.60)
No	77 (19.40)

Overall situation of the funding operation

Students' overall evaluation of the school's financial assistance program

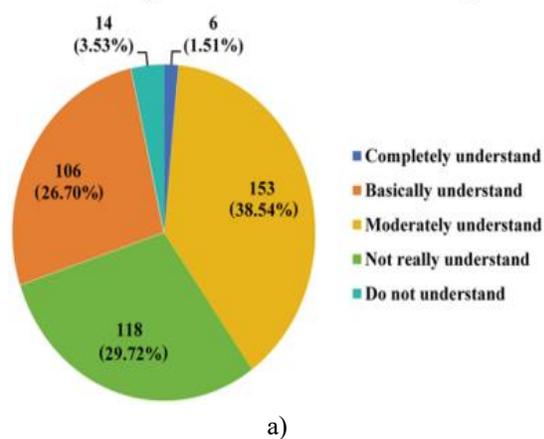
Overall, students reported a favorable evaluation of the university's financial aid initiatives. More than 56.17% of respondents indicated high satisfaction (completely satisfied or satisfied). In addition, 94.71% perceived the scholarship evaluation process as fair (completely fair, fair, or moderately fair). Educational integrity refers to institutional guidance aimed at cultivating honesty and trustworthiness among students, emphasizing sound credit awareness, appropriate student loan management, and the provision of psychological support and competency development training. In this area, 68.27% of students expressed high satisfaction (completely satisfied or satisfied).

Taken together, the existing financial aid system in pharmaceutical colleges and universities has produced positive outcomes, with most respondents agreeing that current funding schemes largely meet students' economic needs. Nevertheless, a subset of students remained dissatisfied and emphasized that financial aid policies require further refinement and more precise targeting.

Details of the funding operation

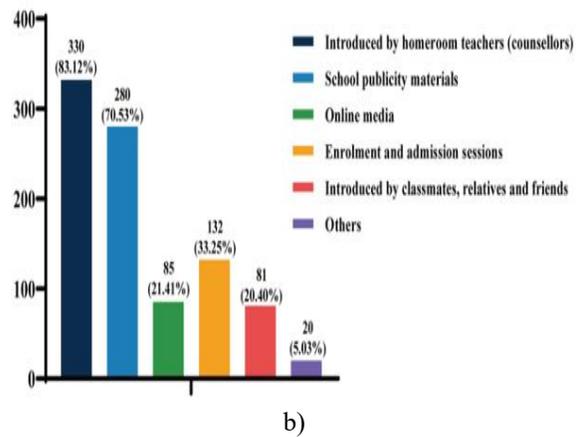
The channels and mechanisms through which students access information about university financial aid policies still require further improvement and diversification. As illustrated in **Figure 1a**, only 1.51% of students reported a comprehensive understanding of these policies, while 26.70% indicated only a basic level of awareness. Across the surveyed population, 83.12% primarily obtained information through guidance from homeroom teachers or college counselors, and 70.53% relied on institutional publicity materials (**Figure 1b**).

Understanding of student financial assistance policies



a)

Students' awareness channels for financial assistance policies



b)

Figure 1. Details of the funding operation: a Students' understanding of financial assistance policies. b Sources of students' awareness of financial assistance policies. N = 397

Analysis of core literacy development demands for impoverished clinical pharmacy students

Financial aid

This study examined the multiple sources used by impoverished students to cover tuition fees and living expenses. As presented in **Table 3**, student loans accounted for 38.04% of tuition payments, whereas different types of scholarships and grants covered 29.97% of educational costs. Work-study programs and part-time employment contributed 15.11% of tuition funding, representing a comparatively small share. Family support remained the primary source of financing to varying extents, with 76.07% of tuition fees and 91.69% of living expenses being met by families. However, the exact proportions of parental contributions versus institutional tuition reductions for both tuition and living expenses could not be clearly determined. At present, only 18.39% of students depend on work-study programs to finance their living costs, and 28.46% reported receiving no financial support for either tuition or living expenses. In addition, **Table 4** shows that nearly half of the respondents (48.87%) believed that the number of work-study positions offered by the university should be increased and diversified. Interview participants further explained that existing work-study opportunities are largely limited to roles such as counselors' assistants, office clerks, library aides, and cafeteria part-time staff. These positions often require substantial time commitments and are poorly suited to students with heavy course loads who can only engage in fragmented work periods outside their academic schedules.

Table 3. Survey on tuition fees, living expenses, and sources of financial assistance among impoverished students (multiple choice questions) (N = 397)

Sources of Funding	Tuition fees N (%)	Living costs N (%)	Available funding N (%)
Payments from parents	302 (76.07)	364 (91.69)	-
School fee remissions	9 (2.27)	-	41 (10.33)
Student loans	151 (38.04)	-	-
Various awards and scholarships	119 (29.97)	287 (72.29)	304 (76.57)
Work-study programs	60 (15.11)	73 (18.39)	73 (18.39)
Other sources	31 (7.81)	84 (21.16)	67 (16.88)
Do not have / Not applicable	-	-	113 (28.46)

Table 4. Impoverished students' awareness of financial aid accreditation (N = 397)

Question	Yes N (%)	No N (%)	Not sure / Have seen but not common N (%)
Are there any students around you who are unwilling to tell teachers about their family's financial difficulties in order to "save face"?	148 (37.28)	38 (9.57)	211 (53.15)
Are there any students around you who do not have financial difficulties but have received a national scholarship?	67 (16.88)	97 (24.43)	233 (58.69)
Whether the work-study programs offered by the school meet the demand?	203 (51.13)	194 (48.87)	-

Psychological support

Overall, financial aid was found to have a beneficial effect on students' psychological well-being. Almost all recipients of the National Inspiration Scholarship (97.37%) reported that the award substantially reduced their financial pressure. In addition, 64.47% of recipients stated that receiving the scholarship renewed their motivation and enthusiasm for learning. One interviewee noted that scholarships not only improve financial conditions but also symbolize recognition of academic effort. Such affirmation can help alleviate feelings of inferiority and social withdrawal that may stem from economic hardship, thereby promoting students' holistic development. Interview data further indicated that supportive attitudes from peers toward students' family backgrounds, along with encouragement for participation in work-study programs, contributed to increased self-confidence. Moreover, a large majority of respondents (92.11%) believed that scholarship schemes effectively stimulated learning motivation and strengthened intrinsic academic drive.

Table 4 further reveals that 37.28% of students felt that their peers were unwilling to disclose family financial difficulties in order to "save face." Four interviewees also reported that although work-study opportunities, scholarships, and other funding programs are generally accepted, they can still evoke feelings of embarrassment.

This underscores the necessity for financial aid policies to emphasize privacy protection and to cultivate an environment in which students feel secure discussing challenges and seeking collective solutions. Regarding the integrity of financial aid allocation, 16.88% of respondents believed that some individuals within their social networks received state grants despite lacking genuine financial need, while 58.69% were unsure. This perception aligns with students' comments that allocation based strictly on academic performance and financial difficulty is considered acceptable, whereas the inclusion of other criteria is often viewed as unfair. Consequently, there is a strong need to further strengthen integrity awareness within financial aid systems.

Academic guidance

The results show that, despite coming from low socioeconomic backgrounds, students demonstrate strong ambitions for continued education. As illustrated in the survey of educational intentions (**Figure 2**), 65.74% of students planned to enter employment after completing a master's degree, and 25.94% intended to pursue doctoral studies before joining the workforce. Notably, only 8.31% planned to seek employment immediately after obtaining a bachelor's degree, a finding that merits further in-depth exploration.

Educational attainment expected by impoverished students

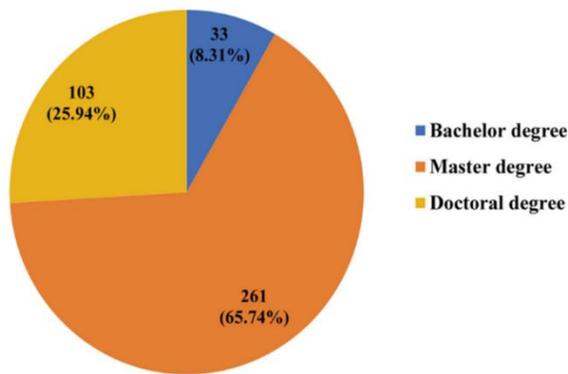


Figure 2. Survey on expected educational attainment among impoverished students (N = 397)

Based on the survey of social practice activities, 60.45% of respondents indicated an intention to obtain professional qualification certificates or skill-level credentials, while 54.66% hoped to participate in internships, social practice programs, or field investigations. In addition, 52.64% expressed a desire to publish in professional academic journals or take part in academic conferences prior to graduation, and 49.87% wished to engage in academic, professional, or design-related competitions. These findings reflect a strong learning motivation among students and underscore the

necessity of strengthening academic support tailored to discipline-specific knowledge and skills to promote the development of core literacy.

Employment assistance

Results from the survey on preferred support measures (**Table 5**) showed that employment assistance was the most frequently requested form of support (68.77%), followed by opportunities for capacity-building training (60.71%). However, focus group interviews revealed that students repeatedly expressed concern about insufficient access to information on overseas study opportunities and postgraduate entrance examinations. When interpreted alongside the questionnaire findings, these concerns suggest that students' strong demand for information on further education is closely linked to their expectations of better employment outcomes and higher income through advanced education as a strategy for overcoming economic constraints. Moreover, several interviewees reported anxiety regarding future employment and felt compelled to pursue further study as a coping mechanism driven by uncertainty and avoidance. Students also emphasized a desire for expanded training in areas such as communication skills, formal writing, and social etiquette, reflecting a lack of confidence in the competencies required in professional environments.

Table 5. Assistance methods desired by impoverished students (N = 397)

Type of Support Needed	N (%)
Employment assistance (guidance on career planning, provision of quality jobs, support for entrepreneurship policies, etc.)	273 (68.77)
Training opportunities (more opportunities for social practice, exchange visits, etc.)	241 (60.71)
Academic support (training in study routines, time management, study strategies and methods, etc.)	188 (47.36)
Further studies (training in courses such as advanced mathematics and English, and sharing of experience in transferring to a university/graduate school, etc.)	171 (43.07)
Skills training (general literacy training in communication skills, official writing, social etiquette, etc.)	167 (42.07)
Psychological counselling (easy access to counselling channels in case of psychological difficulties, etc.)	99 (24.94)
Spiritual care (mentorship, heart-to-heart talks, etc.)	93 (23.43)
Material support (in-kind provision of school supplies, basic necessities, etc.)	89 (22.42)

Cross-tabulation analysis (**Table 6**) revealed statistically significant gender differences in preferences for assistance types, including training opportunities, skills training, and spiritual care. Female students were more likely to seek support in training opportunities ($p < 0.05$) and skills development ($p < 0.001$), whereas male

students showed a greater preference for spiritual care ($p < 0.01$). Additionally, students' home regions were significantly associated with their demand for training opportunities, with those from rural areas being more inclined than students from other regions to request such support ($p < 0.001$).

Table 6. Anticipated support preferences of impoverished students by gender and place of origin (N = 397)

Support Type	Gender N (%)		χ^2	P	Home Region N (%)			χ^2	P
	Male	Female			Countryside	County or township	Urban area		
Employment assistance	66 (63.46)	207 (70.65)	1.846	0.174	124 (67.76)	80 (72.73)	69 (66.35)	1.173	0.556
Training opportunities	53 (50.96)	188 (64.16)	5.609	0.018	127 (69.40)	61 (55.45)	53 (50.96)	11.209	0.004
Academic support	57 (54.81)	131 (44.71)	3.139	0.076	86 (46.99)	50 (45.45)	52 (50.00)	0.461	0.794
Further studies	50 (48.08)	121 (41.30)	1.439	0.230	73 (39.89)	46 (41.82)	52 (50.00)	2.862	0.239
Skills training	29 (27.88)	138 (47.10)	11.628	< 0.001	88 (48.09)	41 (37.27)	38 (36.54)	5.064	0.08
Psychological counselling	20 (19.23)	79 (26.96)	2.451	0.117	50 (27.32)	28 (25.45)	21 (20.19)	1.823	0.402
Spiritual care	34 (32.69)	59 (20.14)	6.746	0.009	33 (18.03)	29 (26.36)	31 (29.81)	5.858	0.053
Material support	22 (21.15)	66 (22.53)	0.084	0.772	46 (25.14)	19 (17.27)	23 (22.12)	2.463	0.292

Overall, financial aid in Chinese universities has evolved from a single, poverty-focused intervention toward a diversified support system that emphasizes students' holistic development [24]. Pharmacy students generally report satisfaction with existing financial aid arrangements; nevertheless, they continue to require varied forms of assistance to strengthen core literacy, enhance competencies, and enrich spiritual and moral development. Such comprehensive support is essential for disrupting the transmission of educational disadvantage associated with family poverty and for responding effectively to students' changing needs.

University financial assistance reduces economic pressure on impoverished students, enabling them to devote greater attention to academic learning and skill acquisition. It also promotes confidence and motivation through academic success and encourages peer interaction, which contributes to teamwork abilities essential for future careers, as well as a stronger sense of belonging and well-being. Conversely, prolonged dependence on financial aid may foster passivity, diminished initiative, or weaker independent problem-solving skills in some students. Furthermore, individual psychological needs related to personal development may not always be adequately addressed in the provision of financial support, potentially affecting both academic outcomes and personal growth.

The long-term influence of university funding on students' academic trajectories is complex and far-reaching. Accordingly, it is necessary to identify potential challenges and implement targeted strategies—

such as psychological development initiatives and capacity-building support—to promote students' comprehensive growth. In terms of improvement pathways, it is vital to uphold a value orientation that integrates individual development with social and national goals while engaging multiple stakeholders. University funding policies should play a central role by strengthening policy dissemination and implementation through diverse on-campus and off-campus platforms. Such efforts can expand developmental pathways for impoverished students in Chinese pharmaceutical universities and enhance the effectiveness of core literacy cultivation. We posit that core literacy enhancement can be achieved through a coordinated, multi-dimensional approach encompassing financial support, psychological assistance, academic guidance, and employment-oriented services.

Implement multiple measures to reduce students' financial concerns through financial assistance

The fundamental aim of economic support is to help students from impoverished backgrounds cope with financial pressure. Financial aid provides the material basis for creating a stable learning environment and for fostering the development of core literacy. Current practices indicate a mismatch between the financial assistance supplied by universities and the changing needs of students, suggesting that existing aid mechanisms are not sufficiently aligned with students' requirements for successfully completing their academic programs.

Expand financial aid channels

Universities and colleges have actively coordinated internal and external resources, broadened funding channels, and established a wider range of scholarships, grants, and special hardship subsidies. In doing so, they have taken on the roles of multiple social stakeholders, promoting coordinated collaboration between governmental support and social assistance while fully utilizing the resources of public welfare organizations.

Enhance precision in financial aid identification

With the elimination of absolute poverty in China, the scope of financial aid identification has been broadened by considering disparities in regional development. At the same time, the application of information technologies and the optimization of operational procedures have been introduced to improve the accuracy and effectiveness of educational financial assistance.

Diversify work-study program formats

Universities may introduce a “study-as-work” model, allowing students to participate actively in academic and extracurricular activities both on and off campus. Achievements such as outstanding academic performance, thesis publication, and involvement in supported teaching activities can be recognized as alternatives to traditional work-study positions and be rewarded with corresponding financial support.

Emphasize education through psychological support and personal character development

The core value of financial aid lies in its people-centered orientation, which also underpins this work. Impoverished students aspiring to become competent pharmacy professionals must demonstrate not only resilience in overcoming difficulties but also sound personality development and firm convictions in serving public health. To strengthen moral character, targeted education in integrity, ethics, and related values should be emphasized.

Strengthen education on ideals and convictions

To align citizens’ moral values with the developmental needs of pharmaceutical students, it is essential to integrate value education into concrete cases and practical activities. This integration links individual growth with collective and societal development by prioritizing personal well-being, cultivating patriotism, and fostering dedication to professional responsibilities.

Strengthen education on gratitude and integrity

The existing financial aid verification system faces challenges such as inaccurate data reporting and delayed repayment of student loans. Addressing these issues requires reinforcing financial literacy and integrity education among impoverished students, encouraging timely loan repayment while cultivating self-reliance, self-improvement, honesty, and trustworthiness. Furthermore, gratitude education should be intensified through lectures, written reflections, and other effective approaches to influence students’ emotional development. Gratitude education emphasizes recognizing and appreciating the diverse forms of support provided by educational institutions. As individuals grow, they are more likely to support others in need and contribute to collective societal advancement. This process fosters a strong sense of gratitude and enhances social responsibility, ultimately achieving an integrated model of financial aid and educational development.

Strengthen education on ethics in science and technology

Ethical awareness related to science and technology within the pharmaceutical field should be cultivated through thematic activities, institutional lectures, and other educational initiatives. These efforts enhance students’ ethical reasoning and judgment regarding emerging advances in bioscience and technology. Students are further encouraged to create value that serves global public interests, public health, and national development from the perspective of a shared future for humanity.

Integrate arts and sciences with academic support to enhance knowledge and practical competence

Students from low socioeconomic backgrounds demonstrate strong learning motivation, indicating a need to reinforce academic support aimed at improving core literacy in specialized knowledge and professional skills. This can be achieved through combined support for cultural and scientific literacy. Core literacy focuses on meaning-making and the ability to contribute to society and promote health in future clinical pharmacy practice. Scientific literacy emphasizes accuracy and rigor, cultivating students’ commitment to truth-seeking, logical reasoning, and scientific thinking throughout their professional education.

Enhancing humanistic education

Students originating from rural regions demonstrate a stronger preference for integrated capacity-building that includes interpersonal communication, formal writing, social etiquette, and related comprehensive competencies. In response, colleges and universities have embedded humanities-oriented courses—such as ethics education, aesthetic appreciation, and classical text interpretation—within the clinical pharmacy curriculum. This curricular adjustment reflects an increased emphasis on cultivating students' personal development and social adaptability. Only when humanistic concern is genuinely incorporated can financial aid be more readily accepted by students, thereby promoting the full realization of essential developmental qualities among undergraduates [25].

Enhancing education in scientific literacy

Scientific literacy represents a foundational competence that supports pharmacy students in adapting to professional environments. It encompasses the knowledge base, practical capabilities, and value systems required for appropriate engagement with other individuals, the natural world, and broader society [26]. The development of scientific literacy requires coordinated efforts in three domains: dissemination of scientific knowledge, cultivation of scientific skills, and internalization of scientific values and ethical norms [27]. Universities should guide students to combine online and offline learning modes, integrate scientific literacy cultivation into routine academic activities, and foster a mindset grounded in respect for science and commitment to truth. Such efforts support students' aspirations for advanced study and sustained academic growth.

Integrating pharmacy education with pharmacy practice to strengthen vocational competence through employment support

Vocational competence constitutes the tangible professional expression of pharmacy students' core qualities, reflected in both disciplinary expertise and applied skills. The cultivation of vocational competence serves as a critical bridge between academic training and future employment, particularly for students from low socioeconomic backgrounds, by enhancing professional awareness, occupational identity, and career development capacity. Effective integration of pharmacy education and practice requires deeper collaboration between universities and affiliated hospitals, enabling students to engage with real clinical environments

through curriculum-embedded hospital pharmacy practice. This goal can be achieved by implementing pharmaceutical clinical research projects as structured career development pathways, thereby strengthening skills acquisition among impoverished students. With appropriate financial backing, students' vocational competence can be further consolidated.

Embedding vocational components within the pharmacy curriculum

Curriculum design should combine core professional courses essential for career progression with content drawn from related disciplines. This interdisciplinary integration aims to increase students' active participation in clinical pharmacy practice and expand their understanding of diverse professional domains. Through immersive learning experiences, students gradually internalize professional knowledge, while experiential demonstrations and intuitive instructional approaches reinforce positive professional attitudes through effective educational engagement.

Incorporating practice-oriented projects into professional learning

By moving away from a discipline-centered, teacher-led model of pharmaceutical education and adopting a student-centered, problem-driven approach anchored in clinical drug research projects, students are encouraged to integrate knowledge across multiple disciplines. This approach equips them to synthesize and apply solutions to complex clinical challenges in uncertain future contexts. Project-based learning aligns students' educational trajectories, faculty research development, and technological innovation in the pharmaceutical sector with major national priorities. Through this process, faculty and students form stable, long-term academic communities that more effectively support impoverished students in enhancing vocational competence while simultaneously advancing core literacy development.

Strengthening innovation and entrepreneurship education

Funding systems within pharmaceutical universities increasingly incorporate the cultivation of innovative thinking and entrepreneurial capability through coordinated collaboration among pharmacy schools and universities. On one hand, innovation and entrepreneurship are promoted through social practice

initiatives, quality development programs, disciplinary competitions, and entrepreneurial project incubation, thereby fostering students' creative capacity. On the other hand, innovation and entrepreneurship initiatives are used to stimulate professional creativity among clinical pharmacy students, supporting academic funding mechanisms and regional economic development associated with the transformation and upgrading of the pharmaceutical industry. This integration of pharmacy education and practice contributes to the creation of a campus environment that encourages innovation and entrepreneurship.

Strengths and limitations

This study expands existing scholarship by offering a systematic examination of financial assistance mechanisms for impoverished pharmacy students. Through the application of a mixed-methods research design, it reveals both the current conditions and developmental needs of students receiving financial support. Moreover, it constructs a structured pathway for enhancing core literacy among impoverished students, grounded in a widely recognized competency framework for pharmacy education.

Nevertheless, because the research site is affiliated with a national ministry, the sampled population of impoverished students is relatively comprehensive, and the institutional funding system is comparatively mature. As a result, the findings may not be directly transferable to local colleges and universities characterized by more heterogeneous student populations and varied financial aid structures. Future research should assess the applicability of these conclusions across diverse institutional contexts and funding environments. Furthermore, the cross-sectional design of this study limits the ability to capture changes over time. Longitudinal investigations tracking pharmacy graduates who have received financial assistance would provide deeper insight into long-term developmental outcomes. Finally, despite assurances of anonymity, response bias cannot be entirely excluded, as participants may have provided socially desirable answers or withheld accurate information regarding sensitive issues.

Conclusion

The cultivation of clinical pharmacy professionals relies on an interdisciplinary framework integrating pharmacy, clinical medicine, and higher education. With the

emergence of new healthcare models and continuously evolving societal demands, the ongoing enhancement of core literacy among students from low socioeconomic backgrounds remains essential. Pharmaceutical universities should support these students in overcoming developmental challenges through coordinated financial assistance, psychological support, academic guidance, and employment facilitation. By systematically examining funding implementation within pharmaceutical institutions, clarifying the developmental needs of disadvantaged students, and proposing an integrated framework that combines financial support, ideological education, academic assistance, and employment guidance, universities can substantially enhance students' capacity to navigate professional development challenges. This approach enables students to realize their potential and cultivate the knowledge, skills, competencies, and professional qualities necessary for academic achievement and career advancement, while simultaneously advancing reform in higher pharmaceutical education.

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