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Developing a Model of Research Self-Efficacy among Graduate Students of Islamic Azad University in Hormozgan Province

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ABSTRACT

Objective: This study aimed to develop a model of research self-efficacy among graduate students at Islamic Azad University in Hormozgan Province.

Methods: The study was applied in purpose and employed an exploratory mixed-methods descriptive design. In the qualitative phase, the population consisted of faculty members and research vice chancellors from universities in Hormozgan Province who had experience teaching research methodology and supervising or evaluating master's theses and doctoral dissertations. Using purposive sampling, 20 participants were selected for semi-structured interviews until theoretical saturation was achieved. Qualitative data were analyzed using open, axial, and selective coding. In the quantitative phase, the population included 4,731 graduate students, from whom a sample of 356 was selected through simple random sampling based on Cochran's formula. Data were collected using a researcher-developed questionnaire derived from qualitative findings. The questionnaire demonstrated acceptable construct validity, and its reliability coefficient was 0.969. Quantitative data were analyzed using confirmatory factor analysis and structural equation modeling with SPSS 26 and LISREL 8.70.

Results: Qualitative findings identified six main components of research self-efficacy: methodological competence, process-oriented competence, communication competence, research attitudes and motivation, disciplinary knowledge competence, and scientific credibility and acceptance. Quantitative results indicated that the proposed model demonstrated acceptable goodness-of-fit indices, confirming the validity of the research self-efficacy model.

Conclusions: The validated model provides a scientific and practical framework for designing university policies and programs aimed at enhancing research self-efficacy among graduate students.

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Introduction

The university is one of the most important pillars of progress in any country and therefore requires serious attention; this, in turn, depends on having faculty members who are experts in their respective disciplines and who employ teaching methods appropriate to the demands of the third millennium. Deepening and expanding the values that govern scientific and professional conduct at all academic levels can enhance the social commitment of faculty members and students, increase public trust in academia, and promote the integrity of scientific communication and research activities. Research is one of the principal sources of human knowledge and awareness and provides the basis for societal advancement. Scholars argue that carefully conducted research can lead to progress in any field (Afra et al., 2023).

Research, particularly at the graduate level, constitutes the core of students' scholarly activities. Graduate students are required to complete research credits and to submit projects and theses that not only strengthen their scientific capacities and research skills but also play a significant role in increasing the scientific output of universities and improving their academic standing and ranking. Nevertheless, student research in Iran and worldwide faces challenges such as low quality, repetitive topics, weak motivation, insufficient understanding of the research process, and environmental constraints, all of which collectively reduce the impact and effectiveness of many studies (Poorbarat et al., 2021).

One of the factors influencing students' research performance is research self-efficacy. Enhancing research self-efficacy within universities improves performance across various academic domains. Students' self-efficacy can increase when they have a proper understanding of the tasks they undertake. Self-efficacy positively affects an individual's interest, effort, persistence, and ultimately performance, and it plays a crucial role as one of the determinants of social competence, academic and occupational satisfaction, and overcoming fears such as social anxiety and technophobia (Afra et al., 2023). Students' research self-efficacy reflects the degree of confidence they have in their ability to perform diverse research activities, ranging from library research to the design and completion of scientific projects, and constitutes an important determinant of graduate students' research success and their persistence in carrying out research. The performance, level of effort, and perseverance of individuals who perceive themselves as talented, efficient, and capable differ markedly from those of individuals who regard themselves as

incompetent and lacking ability. Theoretically, research self-efficacy is considered a strong predictor of scientific research output, and higher levels of research self-efficacy are significantly associated with high-quality scholarly achievements. Conversely, low levels of self-efficacy lead to weaker scientific outcomes (Akbari Farmad et al., 2025).

Research self-efficacy, in addition to influencing students' motivation and behavior, can play a key role in improving the teaching–learning process and enhancing the quality of university education and research. In other words, students with high research self-efficacy, by drawing on their skills and knowledge, can conduct purposeful, innovative, and high-quality research that contributes both to the development of their individual knowledge and to the scientific advancement of the university.

Beyond individual characteristics, the academic environment and the climate of academic departments play an important role in strengthening students' research self-efficacy. A review of previous studies indicates that most faculty members' time is devoted to teaching and that a research-oriented climate is less frequently fostered in academic departments. As the number of graduate students rises and their requirement to complete research credits intensifies, the situation becomes increasingly critical. A research training environment that provides support, motivation, and practical opportunities for students can enhance research self-efficacy, creativity, and innovation in research (Zeinabadi et al., 2017).

International studies have also demonstrated the importance of research self-efficacy in students' academic success. For example, the studies by Hill, Zwahr, and Gonzalez (2022) entitled "*Assessing Research Self-Efficacy in Undergraduates: The Importance of Experience"*; Livinti, Gunnesch-Luca and Iliescu (2021) in "*Research Self-Efficacy: A Meta-Analysis"*; Howard (2021) in "*Students' Reflections on Gaining Skills in Evaluating Research Articles"*; Sunal (2020) on research self-efficacy among doctoral students; and Qiu et al (2019) on the development and psychometric testing of the Research Competence Scale, all indicate that research self-efficacy has a direct impact on the quality of research, students' motivation, and their engagement in research activities. In Iran as well, several studies have addressed research self-efficacy; however, no comprehensive study has yet been conducted to propose a model of research self-efficacy specifically for graduate students.

In the current context, the higher education system faces multiple issues and challenges across various domains, and providing appropriate solutions to these problems requires the presence of a research-oriented and capable generation, particularly at the graduate level. Nonetheless, one of the major gaps in the higher education system is the limited effectiveness of some conducted research, especially studies carried out by master's and doctoral students. Therefore, considering the importance of research in enhancing students' scientific capacities and the standing of universities, as well as the existing gap in providing a practical and operational model for strengthening research self-efficacy, the present study was designed with the aim of "developing a model of research self-efficacy among graduate students of Islamic Azad University in Hormozgan Province." This model is intended not only to improve students' scientific competence but also to contribute to the quality enhancement of both applied and fundamental research conducted in universities.

Accordingly, the necessity of this study can be clarified from two perspectives:

1. Enhancing the level of research self-efficacy among graduate students is crucial for boosting both the quality and quantity of scientific output at universities.
2. We must address the existing gap in higher education concerning student-led fundamental and applied research, and propose a practical model to enhance research performance.

With regard to the research background on graduate students' research self-efficacy, Akbari Farmad et al., (2025) examined the relationship between self-efficacy and students' research performance at university. Their findings showed that there was a significant difference in the mean scores of research performance according to the academic rank of the thesis supervisor, that effective educational interventions are necessary to improve research performance, and that selecting supervisors with higher academic rank can enhance students' research performance. Jahani (2025) conducted a study aimed at investigating the relationship between self-efficacy and test anxiety in students through a systematic review of research findings. The results indicated that high self-efficacy is associated with reduced test anxiety and improved academic performance. Similarly, Ghaderi Sheikh Abadi and Ghanbari (2025) investigated the role of effective teaching by faculty members in students' research performance, with research self-efficacy as a mediating variable. The findings revealed that effective teaching had a significant positive direct effect, a significant positive indirect effect, and a significant positive total effect on students' research

performance at the 0.05 level. Students' research self-efficacy also had a significant positive direct effect and a significant positive total effect on their research performance at the 0.05 level. Azizi Fara (2025) investigated the prediction of research anxiety based on teachers' attitudes toward computers and their research self-efficacy. The results showed a significant negative relationship between research self-efficacy and research anxiety, and both attitudes toward computers and research self-efficacy could significantly predict research anxiety. Furthermore, Safarzadeh (2024) investigated the relationship between futures studies capabilities and research self-efficacy among primary school teachers, with moral intelligence as a mediating variable. The results demonstrated a significant correlation between futures studies competencies and research self-efficacy among primary school educators, mediated by moral intelligence. As a practical implication, the study emphasized integrating futures studies skills into school curricula and using innovative teaching and instructional strategies grounded in research self-efficacy to enhance learners' foresight and futures thinking from primary education through higher education. Shirvani (2024) put forward a causal model delineating the relationships between spiritual intelligence and research self-efficacy, with critical thinking serving as a mediating variable among educators. The findings showed that components of spiritual intelligence had a positive direct effect on components of critical thinking and also a positive direct effect on research self-efficacy. Hosseini (2024) examined the mediating role of e-learning maturity in the relationship between research self-efficacy and job security among primary school teachers. The results demonstrated that e-learning maturity played a significant mediating role in the relationship between research self-efficacy and job security. Research self-efficacy significantly predicted e-learning maturity, and it also significantly predicted job security. Niccum (2025) examined the influence of undergraduate research experiences on students' sense of belonging, research self-efficacy, and scientific identity. Although undergraduate research experiences generally promote positive academic and psychosocial development, their distribution is not uniform. Students who entered the program with higher confidence in their research skills achieved greater gains, and undergraduate research experiences significantly influenced research self-efficacy and the development of scientific identity, particularly in the social sciences and humanities. Li et al. (2025) conducted a study to examine the impact of supervisor support on the research creativity of graduate students in Chinese

universities and the mediating roles of research self-efficacy and intrinsic motivation. The results indicated that supervisor support directly and indirectly through increased research self-efficacy and intrinsic motivation contributed to enhancing students' research creativity. Likewise, Pudwill (2025) examined the effects of gender and perceived organizational support on research self-efficacy among faculty members in dental and allied dental education programs in the United States. The findings revealed that perceived organizational support significantly influenced research self-efficacy, whereas there was no significant relationship between gender and self-efficacy. In another study, Li et al. (2025) explored the question, "How does the supervisor student relationship affect graduate students' anxiety?" and examined the mediating role of research self-efficacy and the moderating role of mindset. The results showed that the supervisor–student relationship had a significant effect on graduate students' anxiety levels and that satisfaction with the supervisor–student relationship was negatively associated with anxiety. Moreover, research self-efficacy significantly mediated the effect of the supervisor–student relationship on anxiety. Yenen (2025) investigated the impact of a computer-based flipped learning model on the research self-efficacy of pre-service teachers. The findings indicated that the use of digital tools not only enabled flexible and self-paced learning but also supported independent problem-solving processes and collaborative learning, both of which are crucial for cultivating mastery experiences that enhance self-efficacy. The computer-based learning model significantly improved research skills and research self-efficacy among pre-service teachers. Hussein Ramadan Atta et al. (2025) examined the relationship between levels of research self-efficacy and concerns about artificial intelligence, on the one hand, and psychological distress, on the other, among nursing researchers. The results indicated that psychological distress was negatively correlated with researchers' self-efficacy and positively correlated with concerns related to artificial intelligence. Finally, Sung (2025) investigated a group of students' reflections on their learning in a digital research project conducted as part of an undergraduate course at a university in Hong Kong. The findings of this study have implications for future implementations of integrated-skills approaches to project-based learning aimed at enhancing students' learning experiences.

Material and Methods

This study was applied in terms of its purpose and employed an exploratory mixed-methods design (qualitative–quantitative) in terms of data type. The statistical population was defined in two qualitative and quantitative sections. In the qualitative section, the population consisted of experts, faculty members, and research vice-chancellors of universities in Hormozgan Province who had experience in teaching research methodology and in evaluating, supervising, and advising theses and dissertations. In the quantitative section, the statistical population included all graduate students of Islamic Azad University in Hormozgan Province in the 2023–2024 academic year, totaling 4,731 individuals.

In the qualitative phase, purposive sampling was used, and semi-structured interviews were conducted with 20 experts until theoretical saturation was reached. Using Cochran's formula, the sample size for the quantitative phase was estimated to be 356 participants. Of the 356 students who participated in the study, 52% were master's students and 48% were doctoral students. Furthermore, approximately 61% of the participants were female and 39% were male. In terms of age, about 3% were 23 years old or younger, 24% were between 24 and 33 years old, 62% were between 34 and 43 years old, and 11% were 44 years old and above. With respect to occupational status, around 15% were full-time students and 85% were employed. In addition, about 27% of the participants were single and 73% were married. The sample was selected using a simple random sampling method.

In the qualitative phase, semi-structured interviews were used to gather data. In the quantitative phase, a Research Self-Efficacy Questionnaire created by the researcher was used. The audit trail method was used to make the qualitative findings more reliable and trustworthy. The audit trail is a well-established approach in validating qualitative research that enables the researcher to present the data analysis process in a transparent, documented, and traceable manner.

In the first stage, following the completion of interviews, initial coding was carried out, during which key themes and concepts were extracted from the interview transcripts and labeled. The extracted codes were then subjected to group review to ensure their accuracy and comprehensiveness. Subsequently, to further increase precision, the final codes were examined by several independent and experienced analysts in the relevant field. The analysts' level of agreement

was measured using Cohen's kappa coefficient, which gave a value of more than 0.98. This means that the coding was very reliable and the analysts were very close to each other. To ensure the content validity of the codes, the findings and final categorizations were subsequently presented to five experts and senior scholars in the research field, and their feedback was integrated. To confirm the analyses and interpretations, some participants were given the results for communicative validation (member checking).

In the quantitative section, Cronbach’s alpha coefficient was used to assess the reliability of the questionnaire. The overall Cronbach’s alpha for the Research Self-Efficacy Questionnaire was 0.969. The construct validity of the questionnaire was examined through confirmatory factor analysis, the results of which are reported as follows.

Confirmatory Factor Analysis and Construct Validity of the Research Self-Efficacy Questionnaire

For the overall model, six components were extracted. In the following, the second-order confirmatory factor analysis model is presented in the form of a path diagram and a corresponding table.

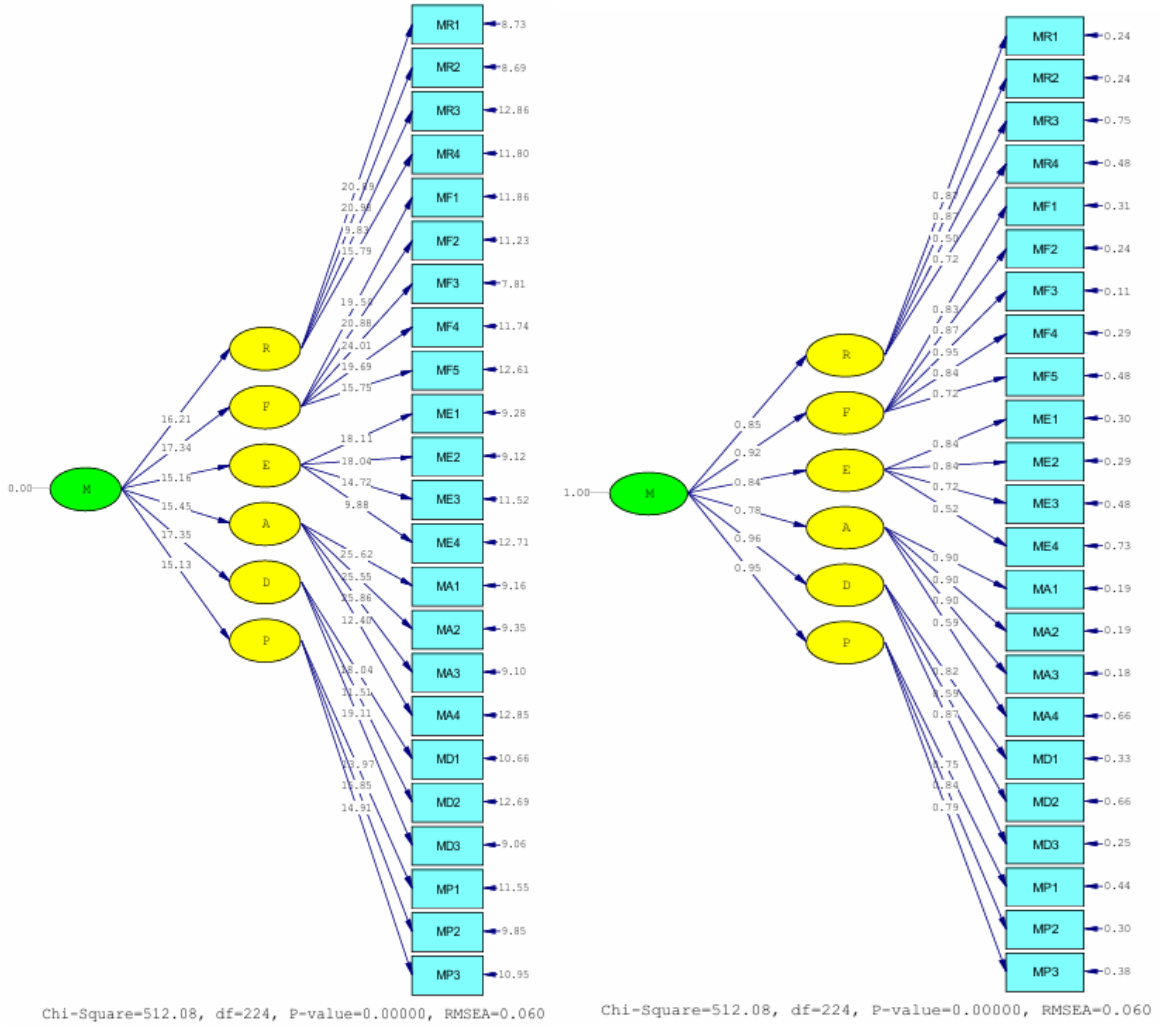

Figure 1. Confirmatory factor analysis model (standardized estimates) **Figure 2.** Confirmatory factor analysis model (significance levels)

(a) Model in the Standardized Solution: The model in the standardized solution presents the factor loadings. As shown in Figure 1, the factor loadings of all components are at an acceptable level. The highest factor loading used to measure the components pertains to "disciplinary knowledge competence," with a weight of 0.96, and the lowest factor loading relates to the component of "research attitudes and motivation," with a weight of 0.78.

(b) Model the significance of the solution: Figure 2 presents the confirmatory factor analysis model in terms of significance coefficients. The numbers shown on the paths represent the t-statistics. Given that all t-values for the paths are greater than 1.96, there is a statistically significant relationship between each component and the total score of this construct.

Table 1. Model Fit Indices

Fit index	Estimated value	Acceptable level	Fit evaluation
Root Mean Square Error of Approximation (RMSEA)	0.06	< 0.08	Excellent
Goodness of Fit Index (GFI)	0.94	> 0.90	Excellent
Adjusted Goodness of Fit Index (AGFI)	0.92	> 0.80	Excellent
Normed Fit Index (NFI)	0.93	> 0.90	Excellent
Non-Normed Fit Index (NNFI)	0.91	> 0.90	Excellent
Comparative Fit Index (CFI)	0.96	> 0.90	Excellent
Incremental Fit Index (IFI)	0.93	> 0.90	Excellent
Standardized Root Mean Square Residual (SRMR)	0.032	< 0.05	Excellent

As shown in Table 1, the values obtained for the model fit indices are in line with accepted standards, and it can therefore be stated with confidence that the research model enjoys an excellent level of fit.

Results

What are the components of research self-efficacy among graduate students of Islamic Azad University in Hormozgan Province?

Table 2. Main categories related to the components of research self-efficacy

Interview code(s)	Open codes	Axial codes	Selective codes
-M1N1 -M2N4 -M14N4, 7 -M11N1, M12N1, M15N3, M16N2 & M20N2	-Research skills, including the use of data collection and data analysis methods -Specialized and technical skills in research methods, data analysis, results, and their interpretation in conducting advanced studies -Ability to analyze and interpret data -Possessing research skills	Possession of research skills	Methodological competence
-M5N7 -M13N4	-Having a problem-solving mindset -Problem-solving skills	Presence of thinking skills in the research domain	
-M14N8	-Mastery of information and communication technologies (ICT)	Possession of ICT related skills	
-M1N2 -M9N5 -M15N8	-Having a scientific attitude and approach to research -The student's research paradigm -Positive attitude toward research challenges and obstacles	Scientific approach to research	
-M2N1 -M13N4, M20N4 -M15N10, M18N4	-Ability to face research challenges and problems -Research resilience -Risk-taking and courage in dealing with challenges	Patience and tolerance in the face of challenges and ambiguity in the research process	
-M15N13	-Being organized and disciplined	Orderliness and discipline in the process of conducting research	
-M1N3 -M9N4	-Identifying and formulating an appropriate research topic -Mastery of the research subject	Ability to identify and formulate research topics	Process-oriented competence

-M8N1, M9N7, M18N7 -M12N3	-Feeling capable of conducting research -Ability to carry out various stages of the research process	Authority in advancing the stages of research work	
-M1N4 -M2N5 -M5N6, M14N5	-Use of effective communication techniques -Ability to collaborate and engage in constructive interactive relationships -Interpersonal communication skills	Establishing appropriate communication in research-related domains	Communication competence
-M2N2, M5N3, M5N8, M11N3, M12N5, M14N1, M16N3 & 4 -M3N2, M6N2 & 3 -M7N1 & 4, M15N1, 4, 5 & 9, M18N5 & 6 -M13N1 & 3	-Self-confidence -Sense of self-belief -Feeling assured of one's ability to successfully conduct research -Managerial and time-control skills; personal capabilities	Presence of psychological skills related to research	Research attitudes and motivation
-M4N1	-Ability to carry out an independent research project	Work independence in research	
-M5N4	-Awareness of oneself and one's capabilities	Self-awareness while conducting research	
-M12N4 & M14N6 -M15N11	-Motivation and commitment to research -Maintaining commitment and perseverance in conducting research	Sense of commitment to advancing research work	
-M2N3, M9N6, M13N2, M14N2, M17N1 & 2 & M20N3 -M3N1 -M5N5 -M7N3 -M12N2 -M18N1 & 3 & M15N2	-Interest in conducting advanced research -Concern and preoccupation with doing research -Motivation, interest, and determination for research -Sense of attachment to research work -Personal motivation and goal setting -Interest in the field of study	Inner concern and intrinsic inclination toward research	
-M9N8 -M14N3	-Hope for problem solving as an outcome of research -Achieving research goals	Belief in the usefulness of research work	
-M11N5	-Sense of enjoyment in conducting research	Feeling of joy and excitement while conducting research	
-M5N1, M6N1, M9N3, M10N1, M11N2 & 4 & M15N6 & 7 -M7N2 -M13N5 -M16N1 -M18N2 -M20N1	-Research knowledge -Proper understanding of research work -Strong theoretical foundations -Familiarity with the principles and fundamentals of research -Specialized knowledge in one's field of study -Scientific awareness	Possession of research knowledge	Disciplinary knowledge competence
-M6N4, M9N1 & M11N6 -M15N12	-Successful research experience -Achieving success in conducting research	Successful research experiences	
-M9N2 -M10N2	-Receiving appropriate and positive feedback from audiences -Professional competence and qualification in conducting research	Confirmability in conducting research	Scientific credibility and acceptance

The data presented in the above table indicate that six key categories methodological competence, process-oriented competence, communication competence, research attitudes and motivation,

disciplinary knowledge competence, and scientific credibility and acceptance constitute the components of research self-efficacy. Among these, the three components of research attitudes and motivation, methodological competence, and disciplinary knowledge competence are the most prominent, while the remaining categories occupy subsequent levels of importance.

To establish the reliability and validation of the findings and results, the inter-rater agreement coefficient for the analytical units assigned to the components was obtained using the judgments of five experts. For this purpose, the components listed in the table were presented to the experts, and their views on each category were collected and taken into account. To achieve this, a dichotomous questionnaire (agree/disagree) was designed to assess the extent to which experts in the fields of research and research methodology concurred with the components derived in this study, and it was administered to five specialists. In addition, an open-ended column was included alongside each component in the questionnaire to allow experts to provide corrective comments and suggestions. The results of the questionnaires indicated a very high level of agreement (98%) among the experts with the components identified by the researchers. Finally, their suggestions and corrective points were incorporated to refine and strengthen the components of the study.

Figure 3. Components of research self-efficacy among graduate students of Islamic Azad University in Hormozgan Province

Examination of Data Normality

Table 3. Results of the Kolmogorov–Smirnov test for the components of research self-efficacy

Component	K–S	Sig.	Result
Methodological competence	0.095	0.133	p > 0.05; distribution is normal
Process-oriented competence	0.138	0.102	p > 0.05; distribution is normal
Communication competence	0.116	0.094	p > 0.05; distribution is normal
Research attitudes and motivation	0.109	0.127	p > 0.05; distribution is normal
Disciplinary knowledge competence	0.114	0.122	p > 0.05; distribution is normal
Scientific credibility and acceptance	0.077	0.216	p > 0.05; distribution is normal

As shown in Table 3, the significance levels obtained for all components are greater than 0.05. Therefore, with 95% confidence, the null hypothesis (H_0) can be accepted and it can be stated that the data in this study follow a normal distribution. Accordingly, parametric tests were used for data analysis.

Validation of the Model of Research Self-Efficacy among Graduate Students of Islamic Azad University in Hormozgan Province

In this section, the main research model comprising the core construct of research self-efficacy together with its facilitating and inhibiting factors is examined.

Structural Equation Model of Research Self-Efficacy

In the following, the structural equation model of research self-efficacy is presented in the form of a path diagram and an accompanying table.

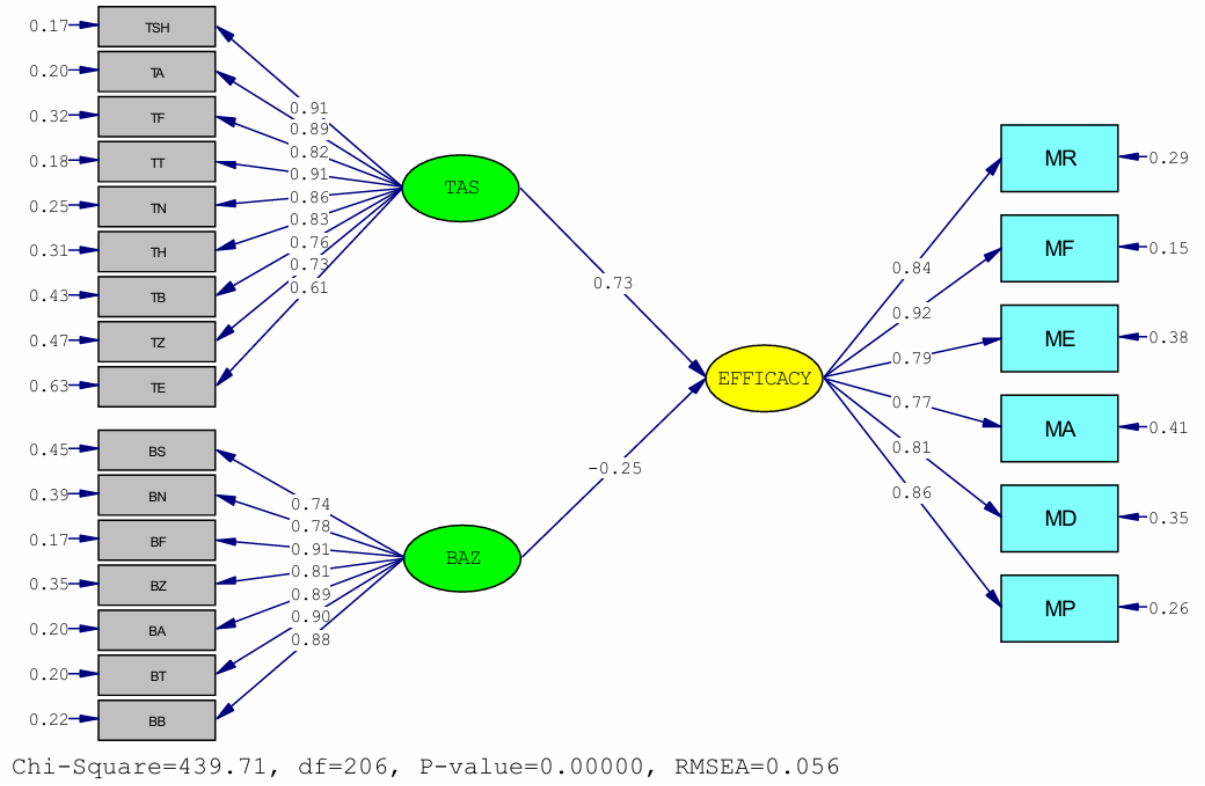

Figure 4. Confirmatory factor analysis model (standardized estimates)

Figure 4 (a) displays the standardized solution. The model in the standardized solution presents the factor loadings. As shown in Figure 4, the path coefficient for the facilitating factors is 0.73 and the path coefficient for the inhibiting factors is −0.25, both of which are significant at the 0.01 level ($p < 0.01$). In other words, the facilitating factors form a strong and positive part of the

structure of research self-efficacy, whereas the inhibiting factors, with a weaker negative effect, also constitute part of it.

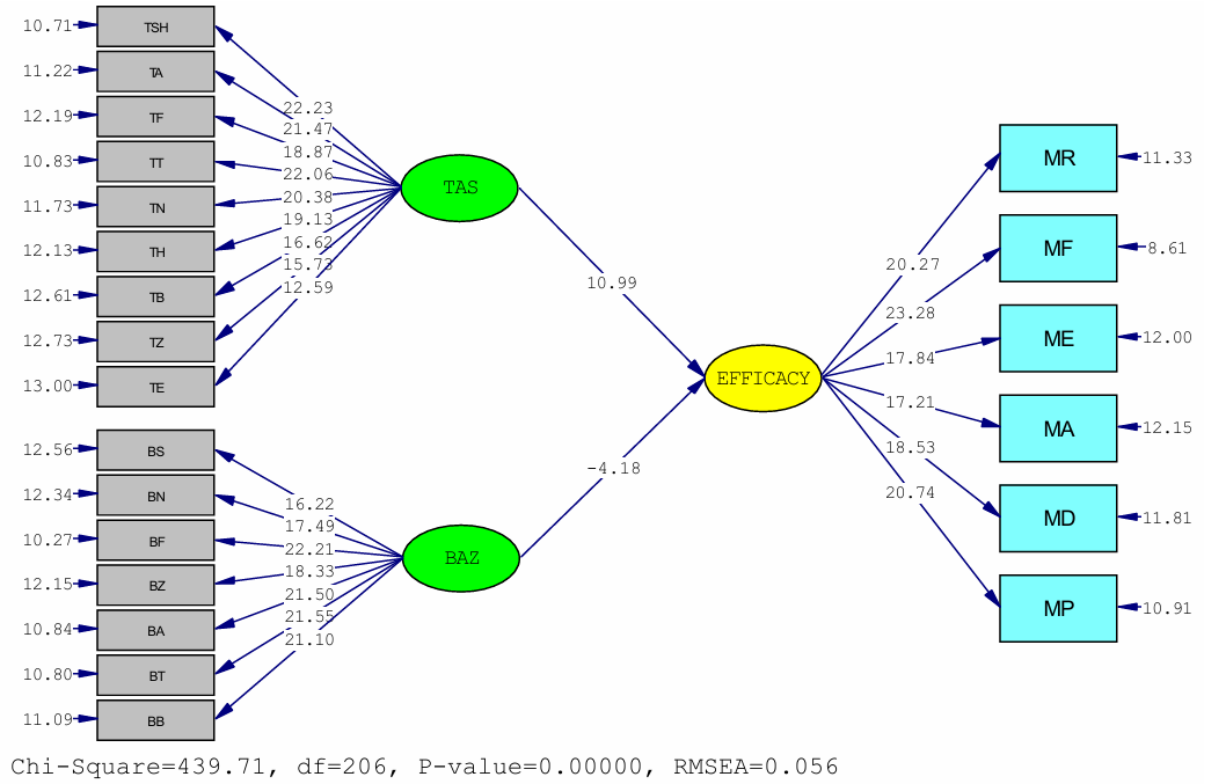

Figure 5. Confirmatory factor analysis model (significance levels)

(b) Significance solution. Figure 5 presents the confirmatory factor analysis model in terms of significance coefficients. Since all t-values for the paths are greater than 1.96, there is a statistically significant relationship between both factors and the overall score of research self-efficacy.

Table 4. Model fit indices

Fit index	Estimated value	Acceptable level	Fit evaluation
Root Mean Square Error of Approximation (RMSEA)	0.056	< 0.08	Excellent
Goodness-of-Fit Index (GFI)	0.98	> 0.90	Excellent
Adjusted Goodness-of-Fit Index (AGFI)	0.97	> 0.80	Excellent
Normed Fit Index (NFI)	0.98	> 0.90	Excellent
Non-Normed Fit Index (NNFI)	0.98	> 0.90	Excellent
Comparative Fit Index (CFI)	1.00	> 0.90	Excellent
Incremental Fit Index (IFI)	0.97	> 0.90	Excellent
Standardized Root Mean Square Residual (SRMR)	0.025	< 0.05	Excellent

As shown in Table 4, the values obtained for the fit indices of the structural equation model of research self-efficacy are consistent with accepted standards; therefore, it can be stated with confidence that the structural model of the study also demonstrates a satisfactory level of fit with the data.

Model of Research Self-Efficacy among Graduate Students of Islamic Azad University in Hormozgan Province

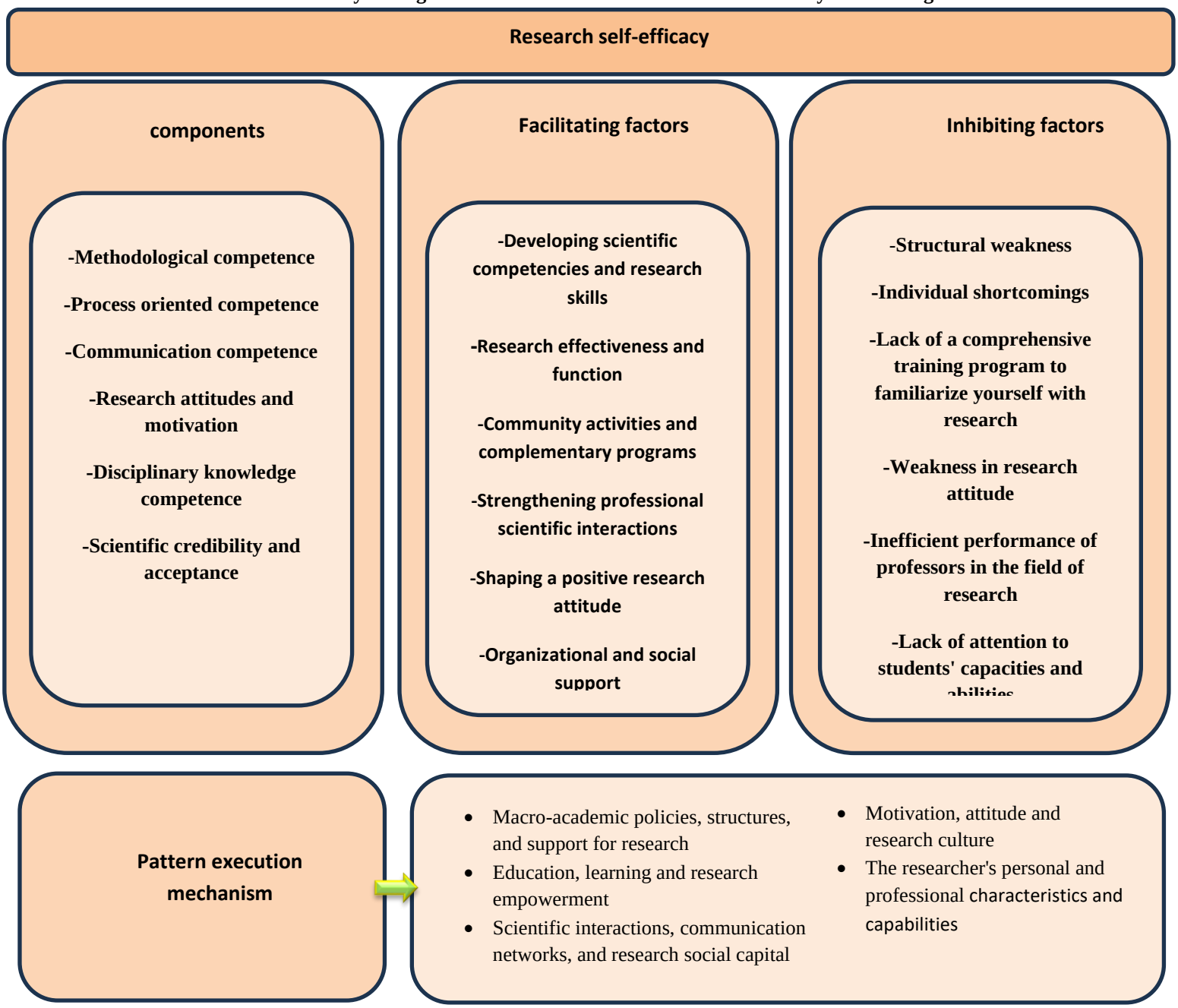

Figure 6. Model of research self-efficacy among graduate students of Islamic Azad University in Hormozgan Province.

Discussion

The aim of the present article was to develop a model of research self-efficacy among graduate students of Islamic Azad University in Hormozgan Province. In response to the question regarding the components of research self-efficacy in these students, six key categories were identified: methodological competence, process-oriented competence, communication competence, research attitudes and motivation, disciplinary knowledge competence, and scientific credibility and acceptance. Among these, the three components of research attitudes and motivation, methodological competence, and disciplinary knowledge competence were the most prominent, while the other categories occupied subsequent levels of importance.

In this regard, it can be argued that research skills such as the use of data collection and data analysis methods; specialized and technical skills in research methodology, data analysis, and interpretation of results in advanced studies; higher-order thinking skills in the research domain, including problem-solving, creative, inductive, and deductive thinking; and information and communication technology (ICT) skills must be present in individuals who attain research self-efficacy. In other words, the presence of such skills in a researcher allows one to legitimately claim that the individual possesses research self-efficacy. A scientific approach to research, which essentially reflects a problem-solving orientation and method, as well as openness and tolerance in the face of challenges and ambiguity during the research process, should be evident in the researcher. Orderliness and discipline in carrying out research tasks likewise reflect a scientific orientation.

The category of mastery over the stages and procedures of research refers to a sense of authority in advancing the different stages of research work and to the ability to identify and formulate appropriate research topics. The researcher should be capable of using effective communication techniques, collaborating and engaging in constructive interactive relationships, and demonstrating strong interpersonal communication skills. The category of having appropriate personality traits and psychological skills for conducting research implies that the individual possesses research-related psychological skills, including self-confidence, a sense of self-belief, assurance in one’s ability to successfully complete research, and managerial and time-management

skills. The individual should also have reached a level of independence in research work and act in a self-aware and vigilant manner throughout the research process.

The component of feeling committed to advancing research work indicates that the researcher displays motivation, commitment, concern, and perseverance while conducting research. The researcher should have an inner preoccupation with and inclination toward research, fundamentally believe in the value and usefulness of research work, and experience a sense of enjoyment and enthusiasm when engaging in research activities. The component of mastery of specialized knowledge related to the research domain implies that the researcher possesses research knowledge concerning various research issues, has developed an appropriate understanding of research work, and is proficient in theoretical foundations and research methodology. Furthermore, the researcher must possess specialized knowledge in the academic field where the research takes place.

The category of scientific awareness and successful professional experiences in conducting research indicates that the researcher has previously achieved success in carrying out research projects and has obtained relative accomplishments in this area. Finally, the component of being endorsed by the target scientific community in conducting research conveys that, along the path toward research self-efficacy, the researcher must receive appropriate and positive feedback from audiences, and his or her professional competence and qualification to conduct research must be acknowledged and approved by experts in the field.

Overall, the results of this part of the study are consistent with the findings of research by Akbari Farmad (2025), Hosseini (2024), Afra et al. (2023), Pourbarat et al. (2021), Zeinabadi et al. (2017), Li et al. (2025), Niccum (2025), Hill et al. (2022), Livinti et al. (2021), and Qiu et al. (2019), and they do not conflict with other studies conducted in the domain of research self-efficacy; rather, they are aligned with them.

A further objective of the present study was to validate the proposed model of research self-efficacy among graduate students—a model developed on the basis of a review of theoretical foundations, prior research, and field findings obtained through qualitative and quantitative methods, and comprising the core construct of research self-efficacy along with facilitating and inhibiting factors. After the model was developed, its fit and validity were examined using confirmatory factor analysis and structural equation modeling. The results of the structural model

analysis indicated that the proposed model of research self-efficacy had an acceptable level of fit and that the relationships among its components were significant.

Based on the analyses conducted in this study, it can be concluded that the proposed model of research self-efficacy among graduate students of Islamic Azad University in Hormozgan Province provides a comprehensive, scientific, and practical framework for explaining the status of students' research capability. This model developed through a review of theoretical foundations, previous studies, and empirical findings derived from qualitative and quantitative analyses shows that students' research self-efficacy is influenced by a constellation of individual, skill-based, and environmental dimensions, and that the interaction among these dimensions shapes the trajectory of research capability enhancement.

At the individual level, the six key components of methodological competence, process-oriented competence, communication competence, research attitudes and motivation, disciplinary knowledge competence, and scientific credibility and acceptance together form the core of research self-efficacy. Among these, the three elements of research attitudes and motivation, methodological competence, and disciplinary knowledge competence are more salient and play a decisive role in strengthening students' confidence in their research abilities. This finding suggests that the development of research skills and the reinforcement of scientific attitudes and motivation constitute the foundation of student empowerment; without adequate attention to these elements, other components cannot exert an optimal effect on research self-efficacy.

In the final analysis, it can be stated that the proposed model of research self-efficacy among graduate students has practical and operational applicability in the university context. It can be used as a scientific and contextually grounded tool for identifying students' research strengths and weaknesses, monitoring the process of research empowerment, and designing effective educational programs and research policies. In this way, the implementation of the model can facilitate students' personal growth, the enhancement of their research skills and competences, the strengthening of their motivation and positive scientific attitudes, and ultimately the production of high-quality and impactful research.

Furthermore, this model can serve as a basis for future research and for university policy-making at both provincial and national levels, as it provides a comprehensive, scientific, and indigenous

framework for developing students' research capability and can play an effective role in improving the quality of higher education and university research. To operationalize the model, it is suggested that five main domains be targeted: (1) university-level research policies and macro-structures; (2) research education and capacity-building; (3) scientific interactions and communication networks; (4) research motivation and culture; and (5) researchers' individual characteristics and competences. This implies that research empowerment is a multidimensional and interactive process that requires purposeful planning, organizational support, and the development of research skills and attitudes at both individual and collective levels.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by ethics committee of Islamic Azad University.

Author contributions

All authors contributed to the study conception and design, material preparation, data collection and analysis. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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