Vol. 4, No. 4, December 2026, pp. 3853-3863
INTERNATIONAL JOURNAL OF
POST AXIAL
FUTURISTIC TEACHING AND LEARNING
https://journal.amorfati.id/index.php/postaxial | | ISSN 3025-7549

Needs Analysis for Strengthening the Growth Mindset of Physics Students in Distance Learning: A Case Study of Universitas Terbuka

Chichi Rahayu [1,2a*], Siswantoyo [3b], Darmono [4d]
[1] Doctoral Program in Educational Science, Universitas Negeri Yogyakarta, Indonesia
[2] Faculty of Teacher Training and Education, Universitas Terbuka, Indonesia
[3,4] Graduate School, Faculty of Education, Universitas Negeri Yogyakarta, Indonesia

[a]chichirahayu.2026@student.uny.ac.id, [b]siswantoyo@uny.ac.id, [c]darmono@uny.ac.id

Article History:
Received:
17-09-2026
Revised:
25-10-2026
Accepted:
14-11-2026
Avaiable online:
07-12-2026

Keywords:
Distance education;
Needs analysis;
Growth mindset;
Physics learning;

***Correspondence Address:**
chichirahayu.2026@student.uny.ac.id

Abstract:
Distance education students learn physics mainly through self-study materials and e-learning, so the way they interpret difficulty may strongly shape their persistence. Research on *growth mindset* in physics has so far been conducted in face-to-face settings, and it is unclear which needs a *growth mindset* intervention should address in fully distance-based physics learning. This study analyses the need to strengthen the *growth mindset* of physics students at Universitas Terbuka (UT) using a sequential explanatory *mixed-methods* design. The quantitative phase was a descriptive survey of 100 purposively selected students using a five-item dichotomous needs-screening questionnaire. The qualitative phase was a systematic literature review of 32 screened sources used to interpret the survey findings. The need index (NI) was highest for stress when solving physics problems (70%), followed by doubt about the effectiveness of learning strategies (65%), perceived difficulty of physics (63%), and inability to understand the material from e-learning alone (53%); self-efficacy showed the lowest need (44%). The overall NI was 59% (moderate category). These patterns are compatible with, but not direct evidence of, a *fixed mindset*, as they may also reflect content demands, limited tutor interaction, and time constraints. The main contribution of this study is a dimension-by-dimension needs map that links each need to a specific intervention component. It recommends embedding *growth mindset* messages in online tutorials together with self-regulated learning strategy training, process-oriented tutor feedback, and step-by-step worked examples.

This is an open-access article under the CC–BY-SA license.

Introduction (مقدمة)

Distance education requires students to learn independently with limited face-to-face interaction. Moore (1989) distinguished three types of interaction in distance education: student–content, student–instructor, and student–student interaction. When interaction with instructors and peers decreases, learning success depends increasingly on student–content interaction. A systematic review by (Martin et al., 2020) of online learning research from 2009 to 2018 showed that learner characteristics and readiness are among the most frequently studied themes, because these factors strongly determine learning outcomes.

Universitas Terbuka (UT) is a public university that delivers all of its programs through distance education. UT students learn through printed and digital learning materials, online tutorials (*tuton*), and independent assignments. (Gafur & Jameel, 2025) found that UT students were fairly disciplined in submitting online tutorial assignments, but their study time management was not yet optimal. This finding indicates that self-management skills remain a weak point for distance learner (Widiasih et al., 2026; Zakirman et al., 2023).

Physics courses add to this challenge. Physics requires an understanding of abstract concepts, mathematical representations, and the ability to solve problems step by step. In online learning, (Winarti, 2021) reported an average learning difficulty of 60.90% among students in a basic physical science course, particularly on indicators requiring hands-on experiments. (Neratania & Sarwanto, 2025) also found that difficulties in learning physics online centred on mathematical calculation, unit conversion, and the application of formulas. Such difficulties readily trigger anxiety; (Suharlan, 2026) reported that most students experienced moderate to high anxiety when facing physics assessments.

Learning difficulties are not purely cognitive. How students interpret difficulty also determines whether they persist or give up. (Dweck & Yeager, 2019) describe two implicit beliefs about intelligence. Individuals with a *fixed mindset* believe that ability is fixed, so difficulty is taken as evidence of low ability. Conversely, individuals with a *growth mindset* believe that ability can develop through effort, effective strategies, and help from others. A longitudinal study by (Blackwell et al., 2007) showed that students with a *growth mindset* improved their mathematics achievement during a school transition, whereas students with a *fixed mindset* tended to stagnate.

Empirical evidence on the effects of *growth mindset* has grown rapidly but has also generated debate. A national experiment by (Yeager et al., 2019) demonstrated that a brief online intervention can raise the grades of lower-achieving students and increase enrolment in advanced mathematics courses. However, the meta-analysis by Sisk et al. (2018) found small average effects that depend heavily on context. A more recent meta-analysis by (Burnette et al., 2022) clarified that interventions are more effective for groups facing academic difficulty. (Yeager & Dweck, 2020) concluded that the key question is no longer whether *growth mindset* matters, but for whom and under what conditions its effects emerge. This conclusion underlines the importance of a needs analysis before an intervention is designed.

In STEM fields, beliefs about ability are closely related to identity and motivation. (Kalender et al., 2019) showed that self-efficacy and perceived recognition from instructors shape students' physics identity. (Canning et al., 2019) found that students in classes taught by STEM faculty holding a *fixed mindset* had lower motivation and larger achievement gaps. (Limeri et al., 2020) added that students' *mindsets* can change during university, becoming either more growth-oriented or more fixed, depending on their learning experiences.

In Indonesia, research on *growth mindset* among university students has begun to develop. (Lestari et al., 2024) found that about 66% of students held a *growth mindset* that was still mixed with fixed beliefs. (Amien et al., 2025) showed that *growth mindset* predicts students' generation of innovative ideas. In physics, (Himawan et al., 2026) found that prior knowledge and *growth mindset* jointly predicted physics learning outcomes, although the partial effect of *growth mindset* was not significant. These studies were conducted in face-to-face settings. To the best of the

authors' knowledge, no study has yet mapped the need to strengthen the *growth mindset* of physics students in a fully distance-based system such as UT.

Strengthening *growth mindset* in distance physics education poses challenges that differ from those in face-to-face settings. First, most *growth mindset* interventions rely on teachers or peers to model and reinforce the message that difficulty is a normal part of learning (Canning et al., 2019; Yeager et al., 2019); at UT, such messages must instead be carried by printed and digital materials and by asynchronous tutor feedback. Second, physics difficulties that are usually resolved through immediate clarification or laboratory work must largely be handled alone, so students have fewer opportunities to experience that effort and better strategies lead to visible progress (Moore, 1989; Winarti, 2021). Third, distance learners must regulate their own study time alongside other commitments, which makes self-regulation, rather than effort alone, a likely bottleneck (Broadbent & Poon, 2015; Gafur & Jameel, 2025). Because the effects of *growth mindset* interventions depend on context and on the needs of the target group (Sisk et al., 2018; Burnette et al., 2022), these conditions leave open which components an intervention for distance physics learners should prioritise.

Accordingly, the novelty of this study lies in mapping, in a fully distance-based physics program, the specific needs that a *growth mindset* intervention should address before such an intervention is designed. This study aims to: (1) describe UT students' perceptions of difficulty, stress, self-efficacy, the adequacy of e-learning, and learning strategies in physics courses; (2) interpret these perception patterns through a systematic literature review on *growth mindset*, while considering alternative explanations; and (3) formulate prioritised needs and recommendations for strengthening *growth mindset* that suit the distance education context. The study contributes (a) a need index for each dimension that can be used to prioritise intervention components and (b) a needs-to-support map that UT can use to design *growth mindset*-oriented online tutorials and physics learning materials.

Method (منهج)

This study employed a sequential explanatory *mixed-methods* design. Quantitative data were collected and analysed first and then interpreted through qualitative data. The qualitative data in this study took the form of a literature review. The two data strands were integrated at the interpretation stage using a *weaving* approach, in which each quantitative finding was discussed alongside the relevant literature (Fetters et al., 2013). The literature review served as a method for synthesising previous research findings systematically and transparently (Snyder, 2019). The participants were 100 Universitas Terbuka students taking physics courses in the odd semester of the 2026/2027 academic year in the Physics Education Study Program. Participants were selected through *purposive sampling*, with the criterion that they were taking or had taken a physics course through online tutorials. Participation was voluntary and anonymous. The quantitative instrument was a five-item dichotomous (yes/no) questionnaire. Each item represents one dimension that the literature associates with *growth mindset*. Table 1 presents the mapping of items, dimensions, and the response direction indicating a need.

The five indicators were selected because each represents a condition that the *growth mindset* literature identifies as a point at which beliefs about ability are activated or tested: (1) perceived difficulty, because implicit theories shape how learners interpret challenging tasks (Blackwell et al., 2007); (2) academic stress, because negative achievement emotions arise when learners feel little control over important outcomes (Pekrun, 2006); (3) self-efficacy, the task-specific belief that one can succeed (Bandura, 1977); (4) adequacy of online learning support, because in distance education the learner–content and learner–instructor interaction determines whether learners receive the feedback needed to see their progress (Moore, 1989; Hattie & Timperley, 2007); and (5) confidence in learning strategies, because *growth mindset* involves the belief that ability develops through effective strategies and not through effort alone (Zimmerman, 2002; Yeager &

Dweck, 2020). The questionnaire was deliberately kept brief and dichotomous because it functioned as a needs-screening tool rather than as a psychometric measure of *growth mindset*, and because a short instrument reduces the response burden on distance learners who complete it independently online.

Table 1. Blueprint of the needs analysis questionnaire

Item	Statement	Dimension	Need-indicating response
1	Is physics a difficult course?	Perceived difficulty	Yes
2	Do you feel stressed when solving physics problems?	Academic stress/anxiety	Yes
3	Are you confident that you can solve the given problems on your own?	Self-efficacy	No
4	Can you understand physics material from the e-learning explanations alone?	Adequacy of online learning support	No
5	Are you confident that your current learning strategy helps you understand physics material?	Confidence in learning strategy	No

The questionnaire items were developed by the authors on the basis of the literature mapping in Table 1, so that each item corresponds to one theoretically grounded dimension. Because the instrument was designed as a brief needs-screening tool rather than as a psychometric scale, it did not undergo formal content validation by an expert panel or pilot testing, and no reliability coefficient was estimated. Content relevance was supported only by the direct correspondence between each item and the construct definitions in the literature, and by the use of short, single-idea statements answered with "Yes" or "No" to minimise ambiguity. Internal-consistency indices such as KR-20 would not have been appropriate in any case, because each item represents a distinct dimension and the need index is interpreted item by item rather than as a total score. Accordingly, the survey results are treated as descriptive indications of students' needs and are interpreted cautiously in the light of the literature rather than as precise measurements. The questionnaire was distributed online via Google Forms in September 2026.

The quantitative data were analysed descriptively as percentages. For each item, the researchers calculated a need index (NI), defined as the percentage of students giving the need-indicating response according to Table 1:

$$NI_i = (f_i \,/\, n) \times 100\%$$

where NI_i is the need index of item i, f_i is the number of students giving the need-indicating response, and n is the number of respondents (n = 100). For items 1 and 2 the need-indicating response is "Yes", whereas for items 3–5 it is "No" (Table 1). The overall need index ($NI_{overall}$) was calculated as the unweighted arithmetic mean of the five item indices, $NI_{overall} = (NI_1 + NI_2 + NI_3 + NI_4 + NI_5) / 5$, which is equivalent to the total number of need-indicating responses divided by the total number of responses ($n \times 5$) × 100%. The five dimensions were weighted equally because the questionnaire did not assume that any one dimension was more important than another. All NI values, including $NI_{overall}$, were categorised using five equal intervals: 0–20% very low, 21–40% low, 41–60% moderate, 61–80% high, and 81–100% very high. The dimensions were then ranked by NI, and the dimension with the highest NI was set as the first priority.

Next, the literature review was conducted in four steps (Snyder, 2019): (1) Search. In September 2026, articles were searched through Google Scholar, Crossref, Garuda, and SINTA-accredited national journal portals. The keywords were *growth mindset*, *implicit theories of intelligence*, *self-efficacy*, *self-regulated learning*, *online learning*, *distance education*, physics learning difficulties, physics anxiety, and physics self-efficacy, combined with Boolean operators (e.g.,

"growth mindset" AND ("online learning" OR "distance education") AND physics). Backward citation searching of key reviews was also performed. (2) Selection. Sources were included if they (a) were peer-reviewed journal articles or peer-reviewed conference proceedings, (b) addressed at least one dimension in Table 1 in an educational setting, (c) were written in English or Indonesian, and (d) were published between 2002 and 2026. Classic theoretical works published earlier were retained only when they define a construct used in Table 1. Opinion pieces, non-peer-reviewed reports, and studies outside educational settings were excluded. (3) Extraction. For each article, the context, participants, design, and main findings related to the questionnaire dimensions were recorded. (4) Thematic synthesis. The findings were grouped into five themes according to the questionnaire dimensions and then integrated with the quantitative data in the discussion. The screening procedure is described below.

Screening was carried out in three stages. First, 118 records were identified through the database search and 98 through backward citation searching; after 42 duplicates were removed, the titles and abstracts of 76 records were screened against the inclusion criteria. Second, 76 full texts were assessed for eligibility, and 22 were excluded because they did not report findings related to any of the five dimensions (n = 4), were set outside education (n = 10), or were not peer reviewed (n = 8). Third, the remaining sources were checked for bibliographic completeness. The final corpus comprised 32 sources (21 international and 11 national): 18 empirical studies, 10 reviews, meta-analyses, or bibliometric studies, and 4 classic theoretical articles (Bandura, 1977; Moore, 1989; Zimmerman, 2002; Pekrun, 2006). Methodological references (Fetters et al., 2013; Snyder, 2019) were not part of the synthesis corpus.

Result (نتائج)

The survey shows that the overall need to strengthen students' *growth mindset* falls in the moderate category ($NI_{overall}$ = 59%, i.e., 295 need-indicating responses out of 500), close to the upper limit of that category. Three dimensions fall in the high category: stress when solving problems (70%), confidence in learning strategies (65%), and the perception that physics is difficult (63%). The other two dimensions fall in the moderate category: the adequacy of e-learning (53%) and self-efficacy (44%). Table 3 summarises the frequency, need index, category, and priority of each dimension, and Figure 1 presents the need index for each dimension in order.

Table 3. Need index, category, and priority of each dimension (n = 100)

Priority	Dimension (item)	f	NI (%)	Category
1	Academic stress (I2)	70	70	High
2	Confidence in learning strategy (I5)	65	65	High
3	Perceived difficulty (I1)	63	63	High
4	Adequacy of e-learning (I4)	53	53	Moderate
5	Self-efficacy (I3)	44	44	Moderate
–	Overall (mean of five items)	295/500	59	Moderate

Note. f = number of students giving the need-indicating response ("Yes" for I1–I2; "No" for I3–I5). Because n = 100, f equals NI. Categories: 41–60% moderate; 61–80% high.

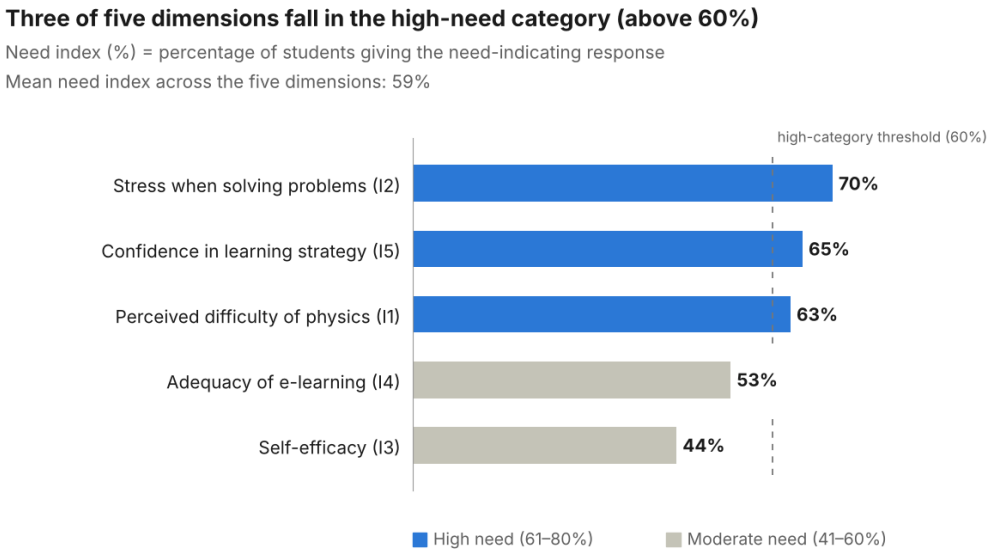

Figure 1. Need index by dimension. Source: research questionnaire data (5 items, n = 100).

These data reveal a pattern worth noting. While 56% of students were confident they could solve problems independently, only 35% were confident that their learning strategies were effective. Because these are marginal percentages, they do not by themselves show how many individual students held both views. However, since 56% + 65% exceeds 100%, at least 21% of respondents must have reported being confident in their own ability while doubting the effectiveness of their learning strategies. Thus, a sizeable subgroup of students appears to feel capable but unsure how to learn effectively. This pattern is examined further in the discussion.

Discussion (مناقشة)

Before the findings are interpreted, one caveat should be stated. The questionnaire captured students' reported difficulties, emotions, and confidence; it did not measure their implicit beliefs about intelligence. A report that physics is difficult or stressful is therefore not, in itself, evidence of a *fixed mindset*. Students holding a *growth mindset* may also find physics difficult and stressful, and the same responses may arise from other sources, such as the conceptual and mathematical demands of the content (Winarti, 2021), limited prior knowledge (Himawan et al., 2026), limited interaction and hands-on experimentation in distance learning (Moore, 1989; Martin et al., 2020), and difficulties in managing study time (Gafur & Jameel, 2025). In the discussion below, the literature is used to identify where *growth mindset* beliefs are likely to matter, namely the points at which difficulty, stress, and strategy failure may be interpreted either as signs of low ability or as signals to change strategy, rather than to infer students' mindsets from the survey responses.

1. Academic stress as the highest need

Seventy percent of students felt stressed when solving physics problems. Control-value theory explains that negative academic emotions arise when individuals feel little control over learning outcomes that they consider important (Pekrun, 2006). Students with a *fixed mindset* tend to interpret difficult problems as a threat to their image of competence, which increases stress (Dweck & Yeager, 2019). This finding is consistent with (Suharlan, 2026), who reported a predominance of moderate to high anxiety in physics assessments. However, the survey cannot determine whether this stress is linked to students' beliefs about ability; it may equally stem from task demands, assessment pressure, or limited time. What the literature suggests is that, whatever its source, stress is more likely to undermine persistence when difficulty is interpreted as a sign of low ability.

Strengthening *growth mindset* has the potential to reduce stress because it reframes difficulty from a sign of failure into part of the learning process. (Zeng et al., 2016) found that *growth mindset*

is related to school engagement and psychological well-being through resilience. In distance education, students do not have classmates who can immediately reassure or help them. Therefore, *growth mindset* messages need to be accompanied by concrete emotion-management strategies. In online tutorials, this could take the form of a short reflection prompt before each problem set, in which students plan what they will do when they get stuck, accompanied by an example of how an error can be diagnosed and corrected.

2. Learning strategies: capable, but unsure how

Sixty-five percent of students were not confident that their learning strategies were effective. This is the second-highest need and the one most relevant to distance education. (Zimmerman, 2002) emphasised that successful self-regulated learners are able to plan, monitor, and evaluate how they learn. The review by (Broadbent & Poon, 2015) showed that time management, metacognition, effort regulation, and critical thinking strategies correlate positively with achievement in online higher education. (Kizilcec et al., 2017) likewise found that goal setting and strategic planning predict the attainment of learning goals in online courses.

This finding is important because *growth mindset* is often misunderstood as simply "trying harder". (Yeager & Dweck, 2020) stressed that *growth mindset* includes the belief that ability develops through effort, better strategies, and help from others. The meta-analysis by (Burnette et al., 2013) showed that *growth mindset* is associated with self-regulation, particularly goal setting and mastery-oriented strategies. Students who feel capable but doubt their strategies need training in learning strategies that have proven effective, such as *retrieval practice* and distributed practice (Dunlosky et al., 2013). This need is also consistent with the finding of (Gafur & Jameel, 2025) that UT students' study time management is not yet optimal. It should also be noted that doubt about one's strategies is not necessarily negative, as it may reflect accurate metacognitive monitoring. The need, therefore, is not to raise confidence for its own sake but to equip students with strategies that are demonstrably effective.

3. The perception that physics is difficult

Sixty-three percent of students rated physics as a difficult course. This perception is understandable because physics demands mastery of both concepts and mathematics (Widia et al., 2021; Winarti, 2021). Perceiving physics as difficult is not, by itself, problematic or indicative of a *fixed mindset*; the literature suggests that what matters is how students respond to that difficulty, which this survey did not measure. (Blackwell et al., 2007) showed that students with a *growth mindset* respond to difficulty by increasing effort and seeking new strategies, whereas students with a *fixed mindset* tend to withdraw.

In STEM, (Limeri et al., 2020) found that the experience of taking difficult courses can shift students' *mindsets* towards a more fixed direction if it is not accompanied by support. Therefore, the message that physics is indeed challenging but can be mastered gradually needs to be conveyed from the beginning of the course.

4. The limits of e-learning as the sole learning resource

Fifty-three percent of students stated that they could not understand physics material from e-learning explanations alone. This finding is consistent with the importance of interaction in distance education (Moore, 1989), although it may also reflect the format of the e-learning materials themselves, for example text-heavy explanations with few worked examples or simulations, rather than students' beliefs. When interaction with tutors is limited, feedback becomes the main means of showing that ability can develop. (Hattie & Timperley, 2007) explained that feedback is most effective when it focuses on the process and self-regulation rather than on the learner as a person.

The role of the instructor is also decisive. (Canning et al., 2019) found that STEM faculty members' beliefs about students' ability influence the motivation of students in their classes. In

online tutorials, tutors can convey *growth mindset* messages through assignment comments, step-by-step worked examples, and recognition of progress. (Martin et al., 2020) also showed that course design and instructor presence are important factors in successful online learning. For online physics learning specifically, this implies supplementing e-learning text with short worked-example videos, interactive simulations or virtual laboratories for topics that normally require hands-on experiments (Winarti, 2021), and feedback comments that point to the next step of a solution rather than only marking it correct or incorrect.

5. Relatively good but possibly fragile self-efficacy

Self-efficacy had the lowest need index (44%), as 56% of students were confident that they could solve problems independently. Self-efficacy is an individual's belief in their ability to complete specific tasks. National studies show that self-efficacy has a positive effect on physics learning motivation and outcomes (Akbar et al., 2025) and can be improved through project-based learning (Febrian et al., 2026). (Kalender et al., 2019) also showed that self-efficacy is an important component of physics identity.

However, this self-efficacy may be fragile, although the present data cannot test this directly. Students who feel capable yet remain stressed and doubtful about their strategies are at risk of losing confidence when they encounter failure. This is where *growth mindset* may act as a buffer, because the belief that ability can develop may prevent failure from immediately undermining self-efficacy (Dweck & Yeager, 2019).

Integrating the Findings: Mapping Needs and Recommendations

Integrating the survey data and the literature review suggests that UT students need more than "you can do it" motivational messages. They need a support package that combines beliefs, strategies, and support. This approach is in line with the findings of (Burnette et al., 2022) and (Dweck & Yeager, 2019) that *growth mindset* interventions are most effective for groups facing real academic challenges and supported by their learning environment. Table 2 maps the needs and the recommended forms of support.

Table 2. Mapping of needs and recommendations for strengthening *growth mindset*

Priority	Dimension (NI)	Form of support in distance education	Basis
1	Academic stress (70%)	A short module on the meaning of difficulty and strategies for managing anxiety before solving problems	(Pekrun, 2006) ; (Zeng et al., 2016)
2	Learning strategy (65%)	Training in independent learning strategies: planning, *retrieval practice*, and distributed study schedules	Broadbent & Poon (2015); Dunlosky et al. (2013)
3	Perceived difficulty (63%)	*Growth mindset* messages at the start of the course, accompanied by stories of students who succeeded through effort and strategy	Blackwell et al. (2007); Yeager et al. (2019)
4	Adequacy of e-learning (53%)	Process-oriented feedback from tutors, step-by-step worked examples, and guided discussion forums	Hattie & Timperley (2007); Moore (1989)
5	Self-efficacy (44%)	Graded tasks with successive small successes to sustain self-efficacy	Bandura (1977); Febrian et al. (2026)

In practical terms, the needs map suggests a sequence for online physics learning at UT. At the beginning of the semester, the first online tutorial session can introduce *growth mindset* messages that explicitly normalise difficulty in physics and explain that progress comes from effort, effective strategies, and help-seeking. Throughout the semester, each tutorial unit can include a short strategy prompt (e.g., planning the steps of a solution, self-testing, or spacing practice), a step-by-step worked example, and a discussion forum task in which students explain where they got stuck. Tutors can use feedback templates that comment on the process and suggest the next step rather than judging ability. Graded problem sets that move from simple to complex tasks can then provide repeated experiences of success to sustain self-efficacy. These components should be piloted and evaluated, because evidence shows that *growth mindset* interventions are effective only for certain groups and under supportive conditions (Sisk et al., 2018; Burnette et al., 2022).

This study has several limitations that should be considered when interpreting the findings. First, the questionnaire was developed by the authors from the literature and was not subjected to formal expert validation, pilot testing, or reliability estimation (e.g., test–retest). Its content validity rests only on the conceptual correspondence between each item and its dimension, and the consistency of students' responses over time is unknown; consequently, the need indices may contain measurement error, and differences of a few percentage points between dimensions should not be over-interpreted. Second, the questionnaire consisted of only five dichotomous self-report items. A single yes/no item cannot capture the intensity or the multiple facets of constructs such as academic stress or self-efficacy, and the instrument did not measure *growth mindset* directly; the findings therefore indicate needs rather than students' mindsets. Third, the sample of 100 students was selected purposively from a single study program, so the findings cannot be generalised to all UT physics students or to other distance education institutions. Fourth, the analysis was descriptive and did not examine relationships between dimensions or differences between student subgroups. Fifth, the qualitative data came from the literature rather than from interviews with students, so alternative explanations for the response patterns could not be examined directly.

Future research should therefore validate the instrument through expert judgement (e.g., Aiken's V) and a pilot test, estimate its reliability, replace the dichotomous items with a validated Likert-type *growth mindset* scale, analyse the relationships between mindset and the five dimensions, and complement the survey with in-depth interviews. Despite these limitations, the consistency between the survey patterns and the findings of previous studies reviewed in this article suggests that the identified needs provide a reasonable starting point for designing *growth mindset*-oriented support at UT.

Conclusion (خاتمة)

The need to strengthen the *growth mindset* of physics students at Universitas Terbuka is in the moderate category ($NI_{overall}$ = 59%). The highest needs are managing stress when solving problems (70%), confidence in learning strategies (65%), and how students interpret the difficulty of physics (63%), whereas self-efficacy is relatively good (44%). At least one fifth of the students appear to feel capable but unsure how to learn effectively. These patterns match the conditions under which fixed-ability interpretations become harmful, but they are not direct evidence of a *fixed mindset* and may also reflect content demands, limited interaction, and time constraints.

For Universitas Terbuka, the findings imply that *growth mindset* should be built into the design of online tutorials and physics learning materials rather than delivered as stand-alone motivational messages, through *growth mindset* messages at the start of the course, self-regulated learning strategy training, process-oriented tutor feedback, and step-by-step worked examples. Because the findings are based on a small purposive sample from one study program and a brief, non-validated descriptive questionnaire, they should be regarded as indicative. Future research

should develop and test such interventions with a larger sample and a validated *growth mindset* instrument.

Acknowledgment (شكر وتقدير)

The authors would like to thank the lecturers of the Faculty of Teacher Training and Education, Universitas Terbuka, for their support of this research, as well as the Physics Education students of Universitas Terbuka who kindly participated by completing the research questionnaire via Google Forms.

Bibliography ((مراجع

Akbar, N. I., Khaeruddin, & Palloan, P. (2025). The Influence of Self-Efficacy and Achievement Motivation on Physics Learning Outcomes of Class X Students at SMA Negeri in Bulukumba. *Jurnal Penelitian Pendidikan IPA*, *11*(5), 790–798. https://doi.org/10.29303/jppipa.v11i5.11278

Amien, M. S., Hidayatullah, A., Deviyanti, R., & Lestari, S. (2025). Growth mindset and innovative ideas: The critical role of beliefs about intelligence among higher education students. *Jurnal Inovasi Teknologi Pendidikan*, *12*(4), 408. https://doi.org/10.21831/jitp.v12i4.88707

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191–215. https://doi.org/10.1037/0033-295X.84.2.191

Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit Theories of Intelligence Predict Achievement Across an Adolescent Transition: A Longitudinal Study and an Intervention. *Child Development*, *78*(1), 246–263. https://doi.org/10.1111/j.1467-8624.2007.00995.x

Broadbent, J., & Poon, W. L. (2015). Self-regulated learning strategies & academic achievement in online higher education learning environments: A systematic review. In *Internet and Higher Education* (Vol. 27, pp. 1–13). Elsevier Ltd. https://doi.org/10.1016/j.iheduc.2015.04.007

Burnette, J. L., Billingsley, J., Banks, G. C., Knouse, L. E., Hoyt, C. L., Pollack, J. M., & Simon, S. (2022). A Systematic Review and Meta-Analysis of Growth Mindset Interventions: For Whom, How, and Why Might Such Interventions Work? *Psychological Bulletin*, *149*(3–4), 174–205. https://doi.org/10.1037/bul0000368

Burnette, J. L., O'Boyle, E. H., VanEpps, E. M., Pollack, J. M., & Finkel, E. J. (2013). Mind-sets matter: A meta-analytic review of implicit theories and self-regulation. *Psychological Bulletin*, *139*(3), 655–701. https://doi.org/10.1037/a0029531

Canning, E. A., Muenks, K., Green, D. J., & Murphy, M. C. (2019). STEM faculty who believe ability is fixed have larger racial achievement gaps and inspire less student motivation in their classes. *Science Advances*, *5*(2), eaau4734. https://doi.org/10.1126/sciadv.aau4734

Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving students' learning with effective learning techniques: Promising directions from cognitive and educational psychology. In *Psychological Science in the Public Interest, Supplement* (Vol. 14, Number 1, pp. 4–58). SAGE Publications Inc. https://doi.org/10.1177/1529100612453266

Dweck, C. S., & Yeager, D. S. (2019). Mindsets: A View From Two Eras. *Perspectives on Psychological Science*, *14*(3), 481–496. https://doi.org/10.1177/1745691618804166

Febrian, M. R., Supriadi, B., & Anggraeni, F. K. A. (2026). The Effect of Project-based Learning on Self-efficacy and Learning Outcomes of Physics Students in High School on Momentum and Impulse Learning Material. *Jurnal Ilmiah Pendidikan Fisika*, *10*(2), 196–206. https://doi.org/10.20527/jipf.v10i2.18326

Fetters, M. D., Curry, L. A., & Creswell, J. W. (2013). Achieving integration in mixed methods designs - Principles and practices. *Health Services Research*, *48*(6 PART2), 2134–2156. https://doi.org/10.1111/1475-6773.12117

Gafur, A., & Jameel, A. H. (2025). Learning Strategies of Distance Education Students In Managing Time for Completing Online Tutorial Assignments. *Jurnal Teknologi Pendidikan : Jurnal Penelitian Dan Pengembangan Pembelajaran*, *10*(3), 593–602. https://doi.org/10.33394/jtp.v10i3.16907

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research*, *77*(1), 81–112. https://doi.org/10.3102/003465430298487

Himawan, N. A., Murtono, M., & Hidayatullah, Z. (2026). Predictors of Physics Learning Outcomes: The Role of Prior Knowledge and Growth Mindset. *Jurnal Pendidikan Fisika Dan Teknologi*, *12*(1), 274–281. https://doi.org/10.29303/jpft.v12i1.12141

Kalender, Z. Y., Marshman, E., Schunn, C. D., Nokes-Malach, T. J., & Singh, C. (2019). Gendered patterns in the construction of physics identity from motivational factors. *Physical Review Physics Education Research*, *15*(2). https://doi.org/10.1103/PhysRevPhysEducRes.15.020119

Kizilcec, R. F., Pérez-Sanagustín, M., & Maldonado, J. J. (2017). Self-regulated learning strategies predict learner behavior and goal attainment in Massive Open Online Courses. *Computers and Education*, *104*, 18–33. https://doi.org/10.1016/j.compedu.2016.10.001

Lestari, S., Adira, N., & Mukminin, G. U. (2024). Eksplorasi Growth Mindset pada Mahasiswa. In *Jurnal Psikologi Insight* (Vol. 8, Number 1).

Limeri, L. B., Carter, N. T., Choe, J., Harper, H. G., Martin, H. R., Benton, A., & Dolan, E. L. (2020). Growing a growth mindset: characterizing how and why undergraduate students' mindsets change. *International Journal of STEM Education*, *7*(1). https://doi.org/10.1186/s40594-020-00227-2

Martin, F., Sun, T., & Westine, C. D. (2020). A systematic review of research on online teaching and learning from 2009 to 2018. *Computers and Education*, *159*. https://doi.org/10.1016/j.compedu.2020.104009

Moore, M. G. (1989). Three types of interaction. *American Journal of Distance Education*, *3*(2), 1–7. https://doi.org/10.1080/08923648909526659

Neratania, A., & Sarwanto. (2025). Tren Topik Etnosains Dalam Pembelajaran Fisika: Analisis Bibliometrik Satu Dekade Terakhir. *Proceeding Seminar Nasional IPA XV*, 180–203.

Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review*, *18*(4), 315–341. https://doi.org/10.1007/s10648-006-9029-9

Sisk, V. F., Burgoyne, A. P., Sun, J., Butler, J. L., & Macnamara, B. N. (2018). To what extent and under which circumstances are growth mind-sets important to academic achievement? Two meta-analyses. *Psychological Science*, *29*(4), 549–571. https://doi.org/10.1177/0956797617739704

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, *104*, 333–339. https://doi.org/10.1016/j.jbusres.2019.07.039

Suharlan, L. S. (2026). Gambaran Kecemasan Siswa dan Kesulitan Materi Fisika pada Asesemen Sumatif Semester Ganjil. *Haumeni Journal of Education*, *6*(1), 155–163. https://doi.org/10.35508/haumeni.v6i1.28368

Widia, S., Zahriah, & Rusydi. (2021). Analisis Kesulitan Belajar Fisika Peserta Didik dalam Pembelajaran Daring di SMAN 4 Wira Bangsa Meulaboh. *Analis Kesulitan Belajar…*, *7*(1), 2021.

Widiasih, W., Ismail, I., & Zakirman, Z. (2026). Modelling sequential readiness and learner profiles for extended reality-based learning in open and distance education. *Asian Association of Open Universities Journal*, 1–14. https://doi.org/10.1108/AAOUJ-09-2025-0137

Winarti, P. (2021). Analisis Kesulitan Belajar Mahasiswa dalam Perkuliahan Konsep Dasar IPA Fisika Secara Daring di Masa Pandemi Covid-19. *Jurnal Komunikasi Pendidikan*, *5*(1), 93–107. www.journal.univetbantara.ac.id/index.php/komdik

Yeager, D. S., & Dweck, C. S. (2020). What can be learned from growth mindset controversies? *American Psychologist*, *75*(9), 1269–1284. https://doi.org/10.1037/amp0000794

Yeager, D. S., Hanselman, P., Walton, G. M., Murray, J. S., Crosnoe, R., Muller, C., Tipton, E., Schneider, B., Hulleman, C. S., Hinojosa, C. P., Paunesku, D., Romero, C., Flint, K., Roberts, A., Trott, J., Iachan, R., Buontempo, J., Yang, S. M., Carvalho, C. M., … Dweck, C. S. (2019). A national experiment reveals where a growth mindset improves achievement. *Nature*, *573*(7774), 364–369. https://doi.org/10.1038/s41586-019-1466-y

Zakirman, Widiasih, W., Sukmayadi, D., Aprianti, R., & Nadiyyah, K. (2023). New Pattern to Improving Student Physics Learning Outcomes. *Jurnal Penelitian Pendidikan IPA*, *9*(9), 7439–7444. https://doi.org/10.29303/jppipa.v9i9.3324

Zeng, G., Hou, H., & Peng, K. (2016). Effect of growth mindset on school engagement and psychological well-being of Chinese primary and middle school students: The mediating role of resilience. *Frontiers in Psychology*, *7*(NOV). https://doi.org/10.3389/fpsyg.2016.01873

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice*, *41*(2), 64–70. https://doi.org/10.1207/s15430421tip4102_2