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An analysis of how peer mentors at university adjusted their mentoring strategy to facilitate better mentoring practice during COVID-19 from 2019–2021

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Abstract: A university launched a peer mentoring program to help students transition from school to undergraduate studies, focusing on social, cultural, and scholarly aspects of their early university experience. The COVID-19 pandemic introduced new challenges for first-year students as teaching shifted online, creating a virtual environment. Peer mentors adapted their strategies to guide students effectively through this transition, despite having little prior experience in virtual mentoring. This study uses a mixed-method approach, combining statistical analysis with sentiment and topic modelling, to evaluate pre- and post-pandemic mentoring experiences. It found that while mentees often overlooked the challenges faced by mentors, the latter worked diligently to adapt and support students during this transition. Peer mentors demonstrated 'evolving innovation' to ensure consistency for the students they mentored.

Keywords: COVID-19; peer mentors; peer mentees; first year students; expectations; student poverty; latent Dirichlet allocation model; LDA; sustainable development goals.

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1 Introduction

Student based support structures are fundamental for university applicants. There are several forms of first year university support, yet one form of support is through student peer mentoring, which has the potential to improve student engagement and retention (Smailesa and Gannon-Leary, 2011). The mentoring program was introduced at the University and expanded to support all new undergraduate students. The mentors selected are from second year and upwards to even post graduate students, on a voluntary basis. While the benefits of mentoring are well-documented, there is limited research on why students choose to become or seek out a mentor. Some evidence suggests that having previously been a mentee is a strong indicator of one's likelihood to volunteer as a mentor (Hill and Reddy, 2007). Students who have successfully completed the first year of their course assist new students with their transition to university life and while providing guidance from their own experience, also link them to appropriate sources of academic support. Mentors are selected by the departmental or school mentor coordinator, based on the student's willingness to be a mentor and on the specific requirements that may be deemed necessary per discipline that is been studied.

A faculty-based training and preparation program is coordinated through the faculty at the beginning of each year, and those students who wish to be mentors attend the training. The coordinator from each department is responsible for the overall administration and coordination within the specific schools or departments. According to Boyd et al. (2019), the training component is an important part of this process and should be an ongoing function within the respective schools and departments. While the faculty applies a very generalised training at the start of each academic year to prepare the new mentors for the challenge ahead, the respective schools and departments provide additional training during the year, more tailored to their own disciplinary specific needs.

While the mentors worked in a voluntary capacity, it is compulsory for the new peer mentors to participate in the training workshops which are held prior to the orientation week for first year students. This allows the 'trained' mentors the opportunity to meet new students during the orientation week and provide support to the respective schools and departments during the orientation week. Peer mentors are provided with both a training manual and have access to online information to assist them with their duties.

During the training session the peer mentors are provided with resources in the form of a 'peer mentoring training manual' (Siertsema et al., 2024) which contains several printed and online resources which may be of use to the mentor, as deemed necessary. In addition to the manual, the mentor training deals with additional issues on matters of

cultural diversity and sensitivity. Throughout the year, the respective school or departmental coordinator provides ongoing support to the peer mentors. By the end of the year, the mentors are awarded a certificate of merit, which are presented to the mentors in acknowledgement of their service during the year at a ceremony of recognition.

Post 2019, with the emergence of COVID-19, a national state of emergency was called, forcing students to remain indoors and physical attendance of university activity was suspended. In response to this, the university moved the entire academic program onto an online platform. For the next 12 months, students continued their studies from home or place of residency (Coetzee et al., 2021). Yet, despite the sudden change in circumstances, the mentoring program continued online, with mentors continuing to work with the mentees, but within a digital space. Prior to COVID-19, no experience or training included mentoring on an online platform, and both the mentors and mentees were inadvertently forced to adapt to the changing circumstances induced by COVID-19.

This objective of this study explores how the mentors adapted to the changing circumstances induced through COVID-19 between 2019 and 2021 in comparison to the way in which the mentees perceived the first-year experience during that time, using the first years mentoring experience at a tertiary institution in South Africa.

The COVID-19 pandemic, with its devastating and disruptive effects on the physical, emotional, and volitional well-being of individuals and especially children has exacerbated many of the challenges already encountered by school learners and tertiary students (Maree, 2022). This has brought about challenging times across all areas of human endeavour from a social, economic, and educational perspective. It has also accelerated the adoption and integration of online technology as a means of survival. The impact on teaching and learning at all levels; either primary, secondary, or tertiary has been so profound that some countries even considered cancelling the 2020 academic year (Adeelowotan, 2021).

It is suggested that the careful implementation of emerging digital technologies could serve as a crucial strategy to address this issue, while also significantly enhancing the practice of teaching and learning in this new era. This situation has created a substantial opportunity for innovation across all levels of education. The need for innovation has become increasingly apparent amidst the significant challenges currently facing the education sector (Adeelowotan, 2021). Because there are few longitudinal studies which measure the impact of the peer mentoring programme on long-term student success (Sanchez et al., 2006), the real effectiveness of such a programme is sometimes questioned. This is mainly because of the challenges inherent in collecting and analysing the data, and further qualitative and quantitate restrictions given the direction of causality and significance of the correlations derived from such information (Collings et al., 2014). The work by Rodger and Tremblay (2003) further highlights several specific methodological weaknesses in these types of studies including the non-random approach to studies and the lack of cross-sectional research. Measuring the effectiveness of peer mentoring programmes in maintaining students within a university is difficult (Hill and Reddy, 2007). Furthermore, there is often little or no measurement of personality differences assessed in the samples taken, and a lot of subjective generalisations are proposed within the studies (Rodger and Tremblay, 2003).

Due to the levels of generalisation, Collings et al. (2014) point out that the subjective output measures such as satisfaction, commitment, integration, and self-esteem show mixed results with some studies; highlighting increases of some variables such as satisfaction, yet not all variables increased in the same way due to methodological

concerns used in the study. Rodger and Tremblay (2003), state that the methodological challenges faced within this type of research may have serious implications regarding the findings and the reporting within the literature on mentoring and on student success, indication a form of herd-mentality by the institutions. Methodological problems such as sample size, student profile, perplexing variables, make it challenging to establish the contribution that mentoring makes to retention or progress over a period (Hill and Reddy, 2007). The approach used in this study tries to overcome many of these challenges by differentiation between clusters within the groups surveyed over a longitudinal span of time at the University.

2 Methodology

The peer mentors and mentors are continually monitored by the respective school or department coordinators. These coordinators act as a support to the mentors and manage the mentoring process within the respective schools and departments. Feedback information is collected from the respective coordinators. This information is collected using two sets of surveys which are issued by the school or department coordinators to both the 'peer mentors' (MOS) and the 'peer mentees' (MES).

The first set of surveys was issued one month into the initiation of the first semester and the second survey was issued one month from the termination of the second semester. This helps provide information on changing mentor and mentee experiences. These experiences form the foundation of the sentiment analysis. The mentors and mentees are treated as independent groups in this research. Five sets of surveys were issued to both groups, from May 2019 to October 2021. Individual questionnaires were designed for both groups analysed, namely the 'peer mentors' (MOS) and the 'peer mentees' (MES). Each group surveyed represents a cluster as every year a new cohort mentors and mentees enter the stream. Most mentors, (92%) are mentoring for the first time.

The textual analysis employed in this study follows the methodology outlined by Khan et al. (2021), which includes data extraction, pre-processing, and topic identification. Respondents for both 'peer mentors' and 'peer mentees', were asked to succinctly describe: "In just a few words, what do you recommend would make this experience better?". The deliberate use of the term 'better' minimises subject bias, encouraging participants to critically evaluate the current state of the program and suggest improvements. This question was specifically selected for its ability to extract from the respondent precise, actionable feedback without leading or biasing their responses. This prompts the respondents to focus on improvement suggestions rather than general reflections and the question encourages them to provide constructive, forward-looking feedback that directly targets the areas of the mentoring experience needing enhancement. This wording minimises response bias, as it avoids loaded language or assumptions, instead prompting respondents to identify specific, tangible aspects they believe could be improved.

A potential limitation in this analysis is that the survey was both written and analysed in UK English, which may influence the results or skew their interpretation, particularly given that not all respondents speak English as their first language. Despite this concern, the chosen method remains effective in estimating the emotions expressed by mentors and mentees within the sample (Lexalytics, 2020).

The sentiment scoring was conducted using the Valence Aware Dictionary and Sentiment Reasoner (VADER) approach, which leverages the VADER sentiment lexicon and modifier word lists. Accurate language analysis is essential for deriving reliable sentiment scores, particularly due to the significant variations in lexicons, syntax, and semantics across different languages (Antonakaki et al., 2021). The survey data underwent a filtering and cleaning process, including stemming, word tokenisation, and data normalisation, to ensure consistency. Additionally, data filtering was applied to refine the imported information. This normalisation process involved converting slang and jargon into commonly used terms, while tokenisation was used to categorise words according to their grammatical roles, such as adverbs, nouns, suffixes, verbs, and adjectives (Khan et al., 2021).

Further analysis of the sentiment data involved the application of correlation criteria, factor analysis, and a latent Dirichlet allocation (LDA) model. The LDA model serves as a 'topic model' that identifies underlying topics within a corpus of documents by assigning word probabilities, thereby extracting individual topics. Topic modelling facilitates the abstraction of themes from participant responses collected during the survey process. Sharma and Sharma (2020) developed an automated sentiment analysis system that predicts public emotions using machine learning algorithms (MLA), achieving enhanced accuracy by employing these algorithms to determine topic clusters (Khanchi et al., 2020).

Nguyen (2014) affirms that LDA is a viable clustering algorithm suitable for grouping topics from collections of text data. Sentiment analysis, as applied in this study, is grounded in natural language processing (NLP) and MLA, which autonomously discern the emotional tone underlying online discourse (Korolov, 2021). Lexicons derived from survey responses were collected, processed through NLP techniques rooted in computational linguistics, and incorporated into the LDA model. However, the LDA methodology is not without criticism. A common concern is that the categorisation of text data into topics may not always be intuitively sensible, with the resulting topics often being difficult to describe in a semantically meaningful way, potentially reducing them to arbitrary word lists (Kulshrestha, 2019). The sentiment analysis in this study applies a rule-based system to identify subjectivity, polarity, and key focus areas as expressed by the mentors been analysed.

Exploratory factor analysis (EFA) is a multivariate statistical technique that has become indispensable in the development and validation of social systems and dimensions. A factor represents an unobservable variable that exerts influence over multiple observed measures and accounts for the correlations among these measures (Watkins, 2018). The data contains underlying factors that reveal the deeper concepts embedded within the survey responses. Factor analysis is conducted to determine the maximum likelihood estimate (MLE). In this study, factor analysis is employed to identify underlying relationships among observed variables as determined in the responses acquired from the peer mentors and the peer mentees, thereby reducing data complexity for better interpretation. This statistical method is particularly valuable when dealing with large datasets comprising numerous interrelated variables, as it consolidates them into a smaller set of latent factors. These factors represent common themes or constructs that may not be directly observable but are inferred from the data (Backhaus et al., 2023).

By applying factor analysis, we aim to uncover the fundamental dimensions that influence the mentoring strategies adopted during the COVID-19 pandemic. This

approach allows us to reduce the number of variables to a more manageable set of factors, facilitating clearer analysis and interpretation. According to Sigudla and Maritz (2023), factor analysis is extremely helpful to assist me to detect latent variables that encapsulate the essence of the observed data, providing deeper insights into the mentoring practices and that the constructs measured are valid representations of the underlying phenomena, thereby improving the reliability of the findings.

In this study, factor analysis is conducted using principal component analysis (PCA), for exploring relationships within continuous multivariate data. Typically, the first two principal components (PCs) capture a substantial portion of the variance in the data, which can be visualised using a 'biplot'. A biplot graphically represents the data by projecting the observations onto the span of the first two PCs, allowing for the extraction of information about the various components within the data (Wicklin, 2019).

The application of factor analysis to Likert-scale data is sometimes criticised, particularly when the Pearson product-moment correlation is used to represent relationships between variables, as it can reduce a continuous measurement scale to a dichotomy (Percy, 1976). Factor analysis applied to ordered-categorical survey data often results in over-dimensionality (Van der Eijk and Rose, 2015). However, the extent of this risk is influenced by the specific approach taken in conducting factor analysis, including the number of items, the characteristics of those items, and the underlying population distribution.

When interpreting the information, four key features should be considered. First, the angle between a vector and an axis signifies the significance of the corresponding variable's contribution to the principal component. Second, the angle between pairs of vectors indicates the correlation between the corresponding variables. Additionally, endpoints that are close to each other in the biplot represent observations with similar loadings, and finally, the length of each vector is proportional to the variance of the corresponding variable (Wicklin, 2019). However, it must be noted that the reliance on qualitative data (such as word clouds and thematic analysis) may limit the depth of quantitative insights, potentially leaving room for subjectivity in interpretation.

3 Results

The results are presented in this section. The analysis spans five stages, covering the period from May 2019 to October 2021, with data collected from surveys using a 1 to 5 Likert-type response scales. This ordinal data reflects emotions with equal intervals. Harrell (2015) highlights that ordinal response methods can also be applied to continuous responses to obtain significant inferences.

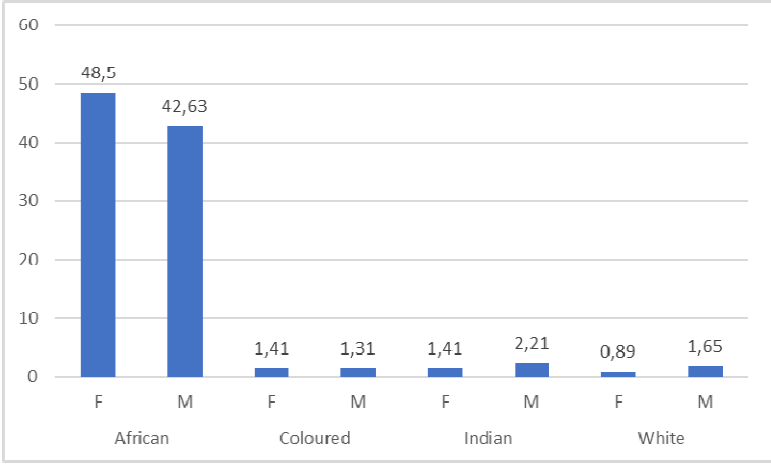
3.1 Demographics

The largest share of students within the faculty is African (91.13%). This is presented in Figure 1. The other groups represented at the university include Indian (3.62%), Coloured (2.72%) and White (2.54%).

Amongst African students, female students make up 48.5% of the undergraduate student-base and male students make up 42.63% of the student base. This is in line with the sample analysed, where 56% of the mentees who participated in the sample were female, and 44% of the mentees were male. Of the mentees sampled, 65% were from

disadvantaged backgrounds and relied on financial support provided by the National Student Financial Aid Scheme (NSFAS). NSFAS is a South African government initiative that offers financial assistance to undergraduate students to cover the costs of their tertiary education following the completion of high school. This funding is administered by the Department of Higher Education and Training (NSFAS, 2024). Amongst the mentor's samples, 78% are female, and 22% are male, with 63% of the mentors coming from a disadvantaged background. The sample had a percentile of 92 who were mentoring for the first time, 61% of whom were third year students, 34% were second year students, and a small percentage (3%) came from fourth year level.

Figure 1 Demographic spread of students within the college of business and economics (see online version for colours)



Source: Demographics, CBE (2021)

3.2 The sample size and distribution

Between May (M) 2019 and October (O) 2021, 1,342 surveys were collected. This comprised of 870 peer mentees who had responded to the mentee surveys and 472 peer mentors who had responded to the mentor surveys. The distribution of samples collected over the period is indicated in Figure 2. Overall, more peer mentees responded than peer mentors.

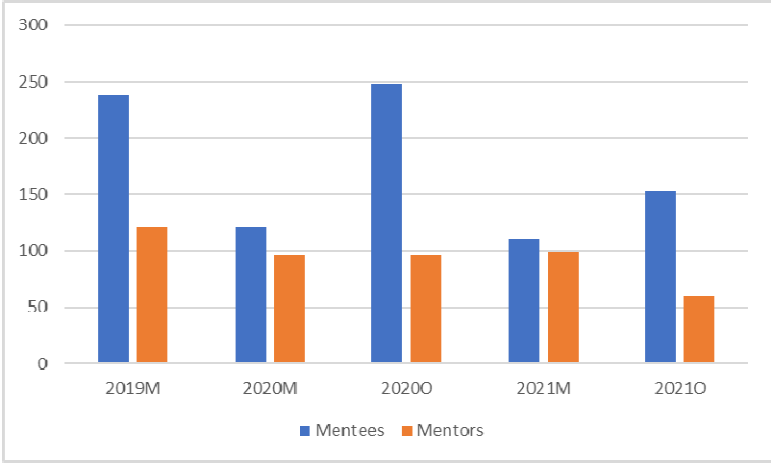
3.3 Sentiment analysis

The sentiment score using the VADER methodology between May 2019 and October 2021, as presented in Figure 3, highlighted two specific outcomes, namely peer mentors regularly indicate a higher score than the peer mentees, except for May 2021, where the peer mentees displayed a higher score than the peer mentors. May of 2021 showed a steep slump in sentiment. Greyling et al. (2021) found that the COVID-19 lockdown had a significant negative impact on overall happiness during that period.

Despite May 2021 being such a slump period for the peer mentees and peer mentors, October showed a significant recovery. This may be due to South Africa lifting the

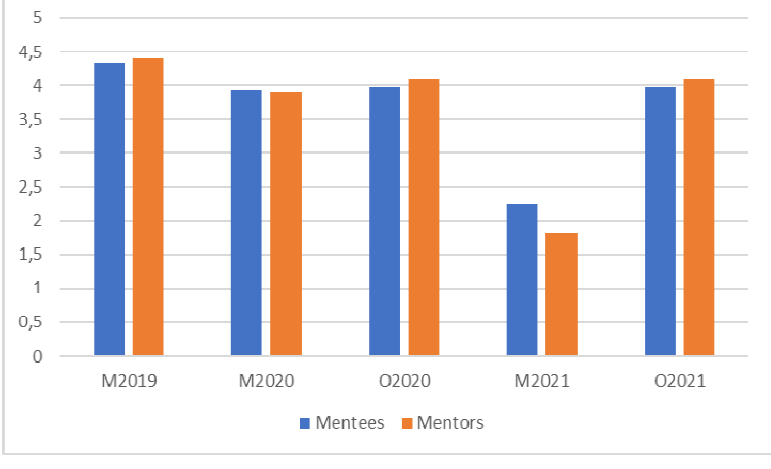
lockdown restrictions, especially regarding the relaxation of restrictions for air travel and updated regulations around school gatherings, sports, and extra-curricular activities (BusinessTech, 2021).

Figure 2 Number of peer mentees and peer mentors surveyed for this analysis between May 2019 and October 2021 (see online version for colours)



Source: Data derived from survey analysis

Figure 3 Changing sentiment scores of the peer mentees and peer mentors between May 2019 and October 2021 (see online version for colours)

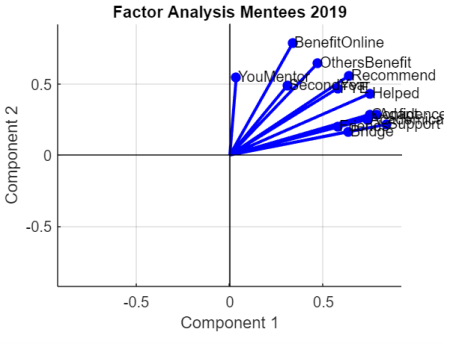
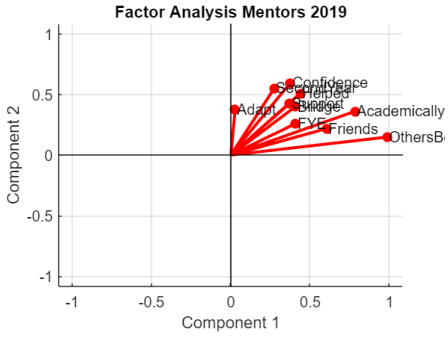


Source: Data derived from survey analysis

As discussed in the methodology section, the following analysis consists of five stages, which are analysed by considering each population sample and the interaction between samples within their own clusters. Note that scale intervals are constant throughout the measuring process. Stage 1 begins in May 2019 and stage 5 ends in October 2021. In 2019, only one survey was released to the sample, but in 2020 and 2021, two sets of surveys, one at the beginning of the academic year, and one at the end of each academic

year. The academic year runs from February to November. The academic year is divided into two equal semesters of 14 weeks each. Each semester is divided into two terms.

Table 1 Stage 1, factor analysis, LDA, sample of comments expressed in the surveys, May 2019 (see online version for colours)

Peer mentees May 2019	*Peer mentors May 2019*
	
	
"peer mentors should try to make time for their students"	"I feel like mentees did not take it serious that much so maybe having a meeting with the mentees mentor and coordinators could help in the future just so they see the seriousness of it"
"try to make more time for students sometimes anticipate students behaviours"	"meet my mentees in social places because I felt like they were not really comfortable when meeting at school felt like we were going to attend a lecture or tutorial"
"to have enough time with the peer mentors"	"maybe a social event or gathering at the end of the semester and to encourage less mentees with every mentor that way it's more personal and mentees feel free to talk about certain issues"
"they should make more time"	"if this could be done throughout the entire university a lot of students would feel less overwhelmed"
"they should make time for manatees"	"nothing it was just horrible mentees"

Source: Data derived from survey analysis, May 2019

3.3.1 Stage 1: May 2019

Stage 1: the first surveys for this specific peer mentoring programme were collected in May 2019. At this stage, the influence of COVID-19 had not yet begun to have an impact as the virus was first detected in Wuhan, China, only in late 2019 (Rath, 2023). From the factor analysis, one can see that the relationship between the peer mentees and peer mentors is developing positively, with emphasis on additional support.

What seems apparent from the feedback comments and the generated infographics presented Table 1, is that peer mentees and peer mentors crave additional time, 'they should make more time', while a structured routine seems is clearly amiss. Peer mentors encourage a social element, while peer mentees seek support. The biplots in row 1 graphically represent the factor analysis which seems to show that there is a mutual or collective response, and that there are no outlying factors that have become apparent at this stage. Using the word cloud analysis presented in row two, we can see that in May 2019, mentees emphasise the importance of structured time, regular communication, engaging activities, and practical support from mentors. They view mentors as facilitators who help them adjust to university life both socially and academically. Mentors, on the other hand, focus on the importance of creating a socially engaging environment, holding regular meetings, enhancing communication, and improving their own skills through training. Both groups align in their desire for structured, consistent interactions, with mentees seeking more hands-on support and mentors recognising the value of additional training to fulfil these expectations effectively.

The analysis of the word clouds in row two indicate that feedback from the mentees prominently features terms such as 'support', 'guidance', 'understanding', and 'communication'. This suggests that mentees highly value the support and guidance provided by their mentors, emphasising the importance of effective communication and a deep understanding of their needs. Additionally, words like 'confidence' and 'motivation' indicate that mentees feel more self-assured and driven because of the mentoring relationship.

In contrast, the mentors' word cloud highlights words like 'development', 'skills', 'experience', and 'growth'. This indicates that mentors are focused on the personal and professional development of their mentees, aiming to enhance their skills and overall growth. The presence of terms such as 'challenge' and 'responsibility' suggests that mentors recognise the challenges involved in mentoring and feel a strong sense of responsibility towards their mentees' progress.

The analysis reveals that while mentees prioritise receiving support and building confidence through effective communication, mentors concentrate on facilitating the development and growth of their mentees.

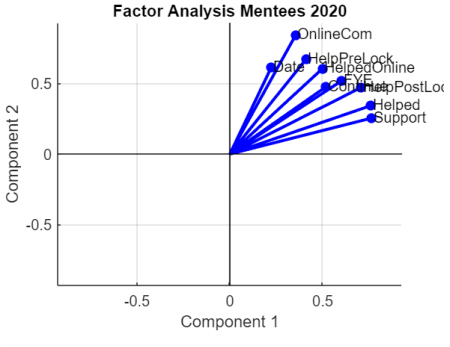
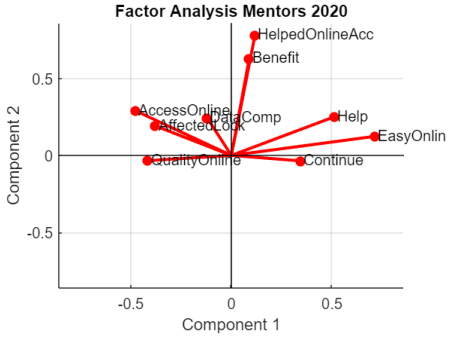
3.3.2 Stage 2: May 2020

Stage 2: by May 2020, the impact of COVID-19 was taking its toll on students, both economically and socially, as can be seen in Table 2. Lockdown had already been implemented and students were reacting to the economic and social change. The first lockdown was announced on Monday 23 March 2021 (SAnews, 2020). While the peer mentees were beginning with the first semester of studies and quite oblivious to the real effect of COVID-19 on university life, the peer mentees already were adjusting themselves quite vigorously to the changing environment. Sentiment for the peer mentees

was higher than that of the peer mentors and had decreased since the year before. While the peer mentors were still quite positive, the difference in attitudes was quite significant.

From early 2020, COVID-19 grew very rapidly, affecting students' expectations. This was clear; pressure is felt by the peer mentors who go out of their way to try resolving some of the issues experienced by the peer mentees. The peer mentees call for better levels of communication, improved and more meaningful support, mostly through stronger communication.

Table 2 Stage 2, factor analysis, LDA, sample of comments expressed in the surveys, May 2020 (see online version for colours)

Peer mentees May 2020	*Peer mentors May 2020*
	
	
"to give them montors camp and guide them how are we supposed to be treated"	"create more fun games for the mentors and mentees"
"I'm able to grow and learn in wisdom with that I can be able to help others as well"	"better training"
"check on us once a week"	"more functions even online to make it more fun"
"to have peer mentors for every module"	"peer mentors having get together once in a trimester for brain storming new ideas"
"just support where you can"	"I would recommend that mentors be paid a salary as mentoring requires a lot of time"

Source: Data derived from survey analysis, May 2020

Morton and Gil (2019) emphasised that the advantages of face-to-face mentoring relationships are closely paralleled by those of online mentoring, or 'e-mentoring',

between peer mentors and mentees. E-mentoring was found to mitigate geographical barriers and alleviate the time constraints inherent in traditional face-to-face mentoring. However, studies comparing different forms of mentorship have yielded inconclusive results regarding which method is more effective (Morton and Gil, 2019). In response, the peer mentors suggested an increase in activities.

In May 2020, mentees prioritise frequent, clear communication, structured support, and group-based guidance to help them navigate the challenges of their first year in a virtual environment. They desire mentorship that helps them adapt academically and provides a sense of community. Mentors, on the other hand, emphasise creating structured programs, collaborative activities, and streamlined methods to make mentoring more effective in the online setting. Both groups focus on communication and structured support, showing a shared understanding of these elements as essential for adapting to the challenges induced by the pandemic.

The word cloud for mentees prominently features terms such as ‘adaptation’, ‘virtual’, ‘support’, and ‘communication’. This suggests that mentees highly valued the support and guidance provided by their mentors during the transition to virtual interactions, emphasising the importance of effective communication and adaptability. Additionally, words like ‘isolation’ and ‘motivation’ indicate that mentees faced challenges related to isolation and sought motivation through the mentoring relationship.

In contrast, the mentors’ word cloud highlights words like ‘technology’, ‘engagement’, ‘flexibility’, and ‘innovation’. This indicates that mentors focused on leveraging technology to maintain engagement and demonstrated flexibility and innovation in their mentoring approaches. The presence of terms such as ‘challenge’ and ‘resilience’ suggests that mentors recognised the difficulties of the period and aimed to build resilience in their mentees.

The analysis reveals that while mentees prioritised receiving support and maintaining communication during the transition to virtual mentoring, mentors concentrated on adapting their methods to effectively engage mentees through technological means.

3.3.3 Stage 3: October 2020

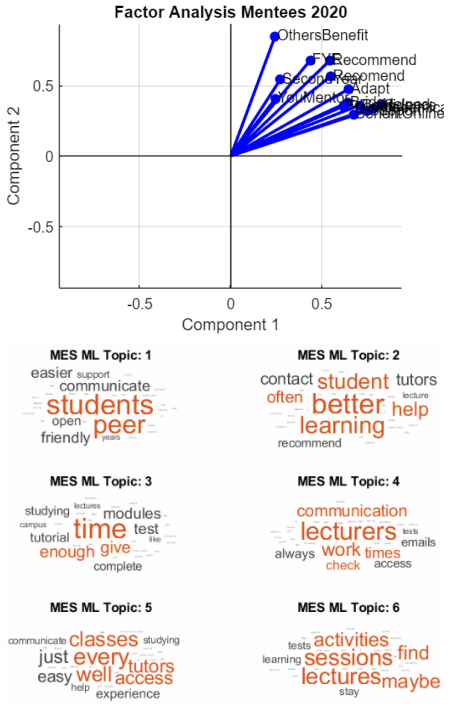
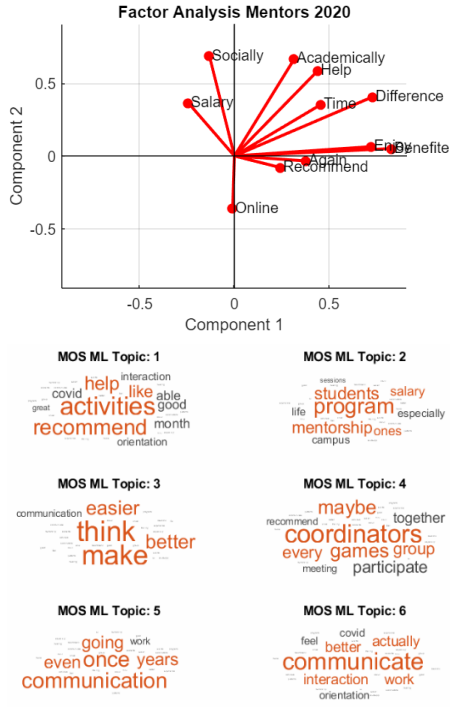
Stage 3: October 2020 was the first year in which campus-based students from the university would have experienced an entire year of online study. The socioeconomic impact is becoming more relevant during late October as households begun to experience the deepening effect of growing unemployment, joblessness, and greater levels of poverty than before. The number of employed people had fallen by nearly 1.5 million, and the wages of workers who still had jobs had fallen by 10%–15% (World Bank, 2021).

During stage 3, as per Table 3, the biplots reveal that the peer mentoring process seems to have become routine and standardised. The peer mentees are looking for ‘better service delivery’, despite this been a voluntary initiative. On the other side of the coin, the peer mentors express that they are looking for better ways of been of service to the students.

At this stage, the peer mentoring process has completely moved online, and the role of technology plays a significantly larger role in expectations. The October 2020 feedback highlights mentees’ desire for accessible resources, structured communication from academic staff, and support with time management. Meanwhile, mentors emphasise the importance of structured activities, consistent support from coordinators, and clear communication to support the remote mentoring environment. Both groups reflect the

ongoing adjustments and emphasise interactive, communicative support to overcome the challenges of virtual engagement.

Table 3 Stage 3, factor analysis, LDA, sample of comments expressed in the surveys, October 2020 (see online version for colours)

Peer mentees October 2020	*Peer mentors October 2020*
	
“peer mentors that actualy do their jobs”	“create more fun games for the mentors and mentees”
“by making an easier to download the video and slides as well as easy to get access on the online classes”	“better training”
“atleast making use of assignments due in a week or so”	“more functions even online to make it more fun”
“mentors should give to their mentees much time to faciltate them some tasks which they did not get-well during lecture or tutorial”	“peer mentors having get together once in a trimester for brain storming new ideas”
“communicating with students more often and keeping them updated at all times”	“I would recommend that mentors be paid a salary as mentoring requires a lot of time”

Source: Data derived from survey analysis, October 2020

Overall, frustration levels begin to rise for both the peer mentors and peer mentees. The process involving the use of technology in innovation follows a typical Schumpeterian pattern of innovation. Malerba and Orsenigo (1995) explain that technological factors which are closely linked to technological regimes play a major role to determine patterns of innovative activities (Malerba and Orsenigo, 1995). Access to online communication tools and the effective use of the internet remains a challenge for some students,

especially those from poorer regions. Many rural areas are not covered with a mobile-broadband network, and fewer rural households have access to the internet. The gap in the mobile broadband adoption and internet use between developed and developing countries is especially large (UNICEF, 2020).

COVID-19 emerged at a particularly difficult moment in world history, coinciding with growing concerns that the fourth industrial revolution would widen the disparity in life opportunities between those with limited access to adequate support structures and resources and those with ample access. This was expected to further intensify the 'Matthew effect', where the wealthy continue to grow wealthier while the impoverished become increasingly disadvantaged (Maree, 2022). Moreover, the experience of studying during the COVID-19 pandemic introduced new challenges to students' psychological and emotional well-being (Mhlanga and Moloi, 2020), with students experiencing negative emotions such as boredom, anxiety, frustration, and anger. UNICEF (2020) reports that limited connectivity not only restricts the ability of learners to engage online but also hinders their participation in the modern economy, isolates them from the world, and, in the case of school closures, particularly those imposed during COVID-19, deprived learners from essential educational opportunities.

By October 2020, mentees focus on access to academic support, structured time management, and engaging activities to supplement their learning experience. They place high value on both social support from peers and academic guidance from mentors and tutors. Mentors, meanwhile, emphasise creating a structured program with engaging activities and simplified processes to support mentees effectively. Both groups continue to prioritise communication, with mentees desiring clarity and availability from academic staff, and mentors focusing on consistent interaction to ensure that mentees receive reliable support in the virtual learning environment.

3.3.4 Stage 4: May 2021

Stage 4: May 2021 saw the new mentees enter the system for 2021. By now the mentors had gained additional experience and were better suited to cope with the available technology. These changes can be seen in Table 4.

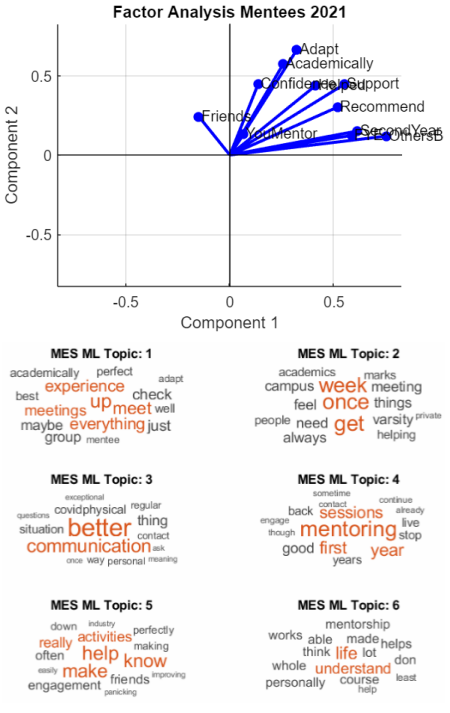
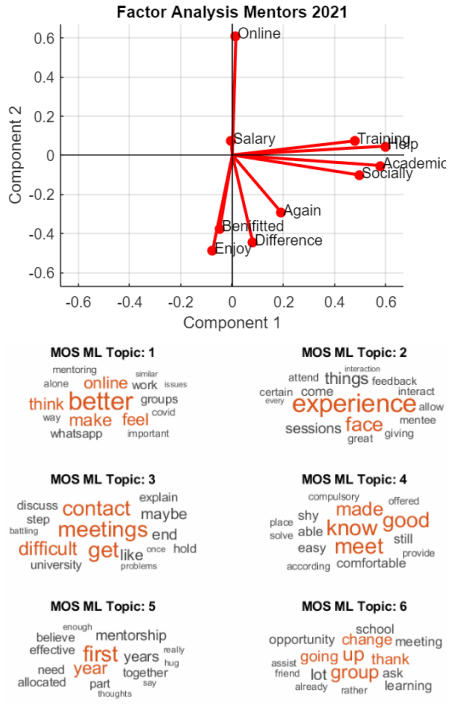
By May 2021, the feedback from mentees and mentors reflects a maturing understanding of the virtual mentoring process, along with specific needs and suggestions for improvement. The biplots in the first row indicate that there appeared to be a sense of atomised structuring in the process beginning at this stage, with the mentees remaining more aligned, but for the mentors, there is still a struggle to find a sense of 'focus'.

During this stage, it seems that the peer mentees, like in previous years, are seeking structured guidance. They seem to have come to rely on the support of the peer mentors, more so possibly due to the extended impact of COVID-19. Both mentees and mentors are now starting to show signs of fatigue "…. students will know n feel that they are not battling issues alone". Sentiment is lowest across all the stages now, and any form of support is valued considerably. Mentors recognise the challenges posed by COVID-19 and are seeking ways of accommodating the students.

In May 2021, mentees emphasise the need for regular, structured meetings and clearer communication, as well as engaging activities that foster a holistic understanding of university life. Mentors, on the other hand, express a desire to improve the online experience, highlight the importance of making mentees feel comfortable, and see group mentoring as an opportunity for both learning and community building. Both groups

reflect an evolving adaptation to the challenges of virtual mentoring, with shared interests in enhancing communication and creating a supportive environment.

Table 4 Stage 4, factor analysis, LDA, sample of comments expressed in the surveys, May 2021 (see online version for colours)

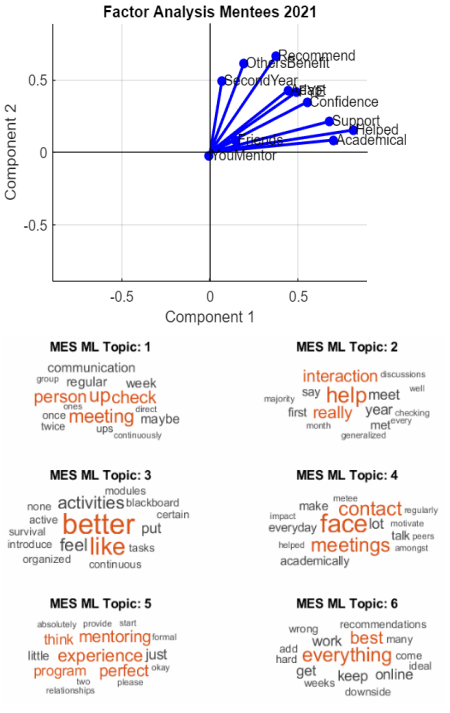
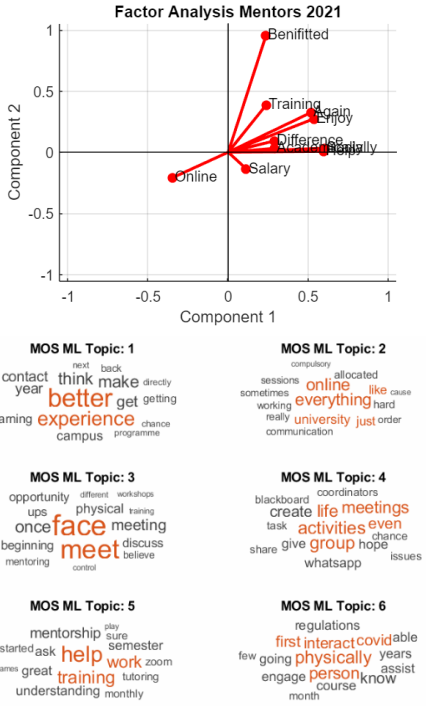
Peer mentees May 2021	*Peer mentors May 2021*
	
“I really don’t have much because coming from the situation we are in covid everything was done perfectly”	“having the mentees evaluate their experience and giving feedback”
“if all the modules had peer mentors”	“I feel face to face interaction is better than online experience”
“a one on one physical session with the mentor at campus would be better”	“if we could meet our mentees and get to know them”
“for mentors to check up on their mentees on how are they holding up academically”	“I think it would better if we mentor students in groups like whatsapp group see if we could solve similar problems together this way students will know n feel that they are not battling issues alone”
“direct communication”	“to have physical social life with our mentees so that our work is recognizable and easy”

3.3.5 Stage 5: October 2021

Stage 5: October 2021, lockdown in South Africa has been lifted however, for the most part; the university had not opened to students at that point in time, many of which were still studying online from remote locations. By October 2021, the final stage of analysis

reflects both mentees' and mentors' evolved perspectives on virtual mentoring, with a focus on refining and optimising the mentoring experience.

Table 5 Stage 5, factor analysis, LDA, sample of comments expressed in the surveys, October 2021 (see online version for colours)

Peer mentees October 2021	*Peer mentors October 2021*
	
"having a regular check up on mentees"	"if we had a few events following covid regulations of course just to get to know them more and give the mentees a chance to get to know each other because in our group experience most of them could not make friends"
"continuously talking to students"	"more physical meetings with mentors would create a more understanding and also give mentees a chance to be used to interact in various activities as a group"
"my experience with my mentor was amazing and if it were up to me I'd tip him all mentors should be like mine"	"if the mentors would meet the mentees face to face even if it was just once in two months"
"better interaction"	"if we could just meet up once cause online was not working out"
"mentoring experience would be better if relationships are built mentors treat all mentees with equality and also when mentors are punctual at most times"	"having monthly activities for both mentors and their mentees in order to boost the mentee's confidence as well as the mentor's confidence in their work and ability to help mentees adjust to the life of being a university student"

As can be seen in Table 5, by October 2021, mentees are focused on regular, personalised interactions and prefer a mix of engaging activities and structured support, with some still valuing the flexibility of online mentoring. Mentors, however, show a clear inclination towards increasing in-person interactions, seeing physical meetings to strengthen engagement and effectiveness. Both groups are reflecting on how to refine their approach after extended virtual engagement, with mentees emphasising continuity and mentors favouring a return to more face-to-face formats to enhance connection and support. The sentiment expressed by the mentees and the mentors has increased considerably. Compared to earlier in the year, the attitude of both the peer mentees and the peer mentors seems to be improving. The peer mentors recognise that the social element is lacking and wish to find ways of addressing the concerns. Peer mentoring has shown a new level of evolution, as mentors recognise the challenges experienced by the peer mentees and the level of altruism has grown. This is most unexpected, and this evolution of thought indicates that the peer mentors are seemingly more dynamic in their attempt to be of assistance to the peer mentees, while coping with the changing environment. Mentees are seeking deeper relationship building and are trying to find ways of narrowing the social gap.

4 Discussion and a sustainability of the mentor strategy in higher education

For each of the stages, the biplots gave an indication of the challenges that were experienced by the mentees and the mentors. Between stage one and stage five, the analysis reveals that the mentors successfully maintained continuous support for the mentees through the length of the COVID crisis, even though they, the mentors, experienced a myriad of challenges themselves. Initially, mentees and mentors focused on in-person support structures, regular meetings, and engagement activities, reflecting traditional expectations of mentorship. However, with the onset of the COVID-19 pandemic, both groups had to adapt to virtual interactions, altering their needs and expectations significantly. Mentees emphasised the need for consistent communication and academic support to navigate the challenges of remote learning. Mentors, meanwhile, recognised the need for innovative approaches, such as using digital tools and creating structured activities to keep mentees engaged in a virtual setting.

Throughout all the stages, effective communication remained a consistent need for both mentees and mentors. Mentees highlighted communication as essential for feeling supported, while mentors saw it to create a structured and engaging environment. The emphasis on communication grew particularly strong during the pandemic, highlighting its importance in maintaining connection and support when in-person interactions were limited. Despite the challenges, both the mentees and mentors alike consistently expressed a preference for structured engagement. Mentees wanted organised meetings and time management support, while mentors aimed to create and sustain structured mentorship programs. This mutual emphasis on structure indicates that both groups view regular, predictable interactions as key to a successful mentoring experience.

Training strategies need to adapt to match the changing needs of the mentees. Mentors and mentees require additional online support and online training. Physical venues are important and specialised meeting places should be provided through a booking system. This is important because we must maintain the human component.

However, an online virtual meeting centre should also be created. This would be very useful, if virtual rooms for one-on-one sessions can be created, or one for multiple group meetings. The feedback demonstrates a growing awareness of the importance of accessibility, particularly during the pandemic. Mentees frequently mentioned needing help with academic challenges, technology, and staying motivated. Mentors, in response, sought to provide accessible, user-friendly support by refining their communication methods and creating inclusive, community-oriented activities.

Mentors could assist with certain tasks, such as the support they provide at the student orientation at the beginning of each year. Peer mentees could provide additional support to individual schools or departments, or in the creation of departmental focus units, for example, student economic societies.

Figure 4 Developing a healthy behavioural change through structural development (see online version for colours)

Note: The process of innovation of the peer mentors.

Source: Derived from the study

Focus areas could be summarised into five areas, namely structure, creativity, activities, visual interface, and recognition (SCAIR). 'Structure' relates to develop improved core competencies to deal with the challenges of COVID-19. Organisations across various industries must cultivate a core competency in implementing effective organisational change to respond to the challenges posed by COVID-19 (Chong and Duan, 2022). A 'creativity' approach should be encouraged. According to Adeelowotan (2021), creativity is a crucial concept that encompasses organisational, team, and individual perspectives.

During times of crisis, an organisation's performance and efficiency are largely evaluated based on its creativity and innovation.

By the final stage in October 2021, mentors expressed a deepened sense of responsibility and altruism towards their mentees, recognising the value of mentoring in helping mentees feel supported and connected. Mentees, on the other hand, valued the mentorship experience not only for academic support but also as a means of building relationships and navigating university life amidst challenging circumstances. Proper 'activities' of engagement strategies to help support the peer mentors while creating something more fluid for the peer mentees (Hill and Reddy, 2007). The role of appropriate 'visual interface' using online system where peer mentees could explore the concept of more visual interactive communication for improved 'live' and 'face' engagement strategies (Smailesa and Gannon-Leary, 2011). Finally, 'recognition' for the dedication by the mentors to aiding and the significance of the mentoring programme on student wellbeing.

The proposed structure presented here could support mechanisms that support both in-person and virtual mentoring options, on an ongoing process, especially in the face of a crisis. This flexibility allows the program to adapt to various circumstances, such as pandemics or other disruptions, ensuring continuous support for mentees. This should be supported with training programs that equip mentors with skills in digital communication tools, virtual engagement strategies, and cultural competency. This could be extended to those that are disadvantaged. Policies that guarantee all students have access to mentoring resources, regardless of their location or personal circumstances. This could be expanded to provide the necessary technological support for students with disabilities.

A key weakness of this paper might be the limited generalisability of the findings due to the specific context and unique circumstances surrounding the COVID-19 pandemic. Since the study focuses on a peer mentoring program during a time of significant disruption, the findings may reflect the unique challenges of remote learning and the abrupt transition to virtual support, which might not apply as directly to typical in-person mentoring contexts or future programs in a post-pandemic setting.

5 Conclusions

Skills shortages are prevalent, and university throughput is at levels which may compromise the ability to meet the needs of the skills shortages within South Africa. Previous studies have shown that the peer mentoring programme has led to improved student performance and throughput rates. While this paper does not measure student success, it examines the innovation, which evolved through the peer mentoring process. Through using several methodologies, name factor analysis, machine learning and the LDA technique to qualify the suggestion that the peer mentoring process may contribute towards developing a healthy behavioural change of both the peer mentors and peer mentees within the programme.

The results of this study illustrate that the peer mentoring program, initially structured around traditional in-person support, adapted significantly to the challenges posed by the COVID-19 pandemic. The mentors demonstrated innovation in adjusting their strategies, while mentees sought reliable support and connection in a predominantly virtual environment. The mentors evolved their strategies to meet the changing needs of mentees during the pandemic. This adaptability reflects a Schumpeterian process of innovation,

where mentors developed and implemented new techniques to maintain engagement and support in a virtual environment. By October 2021, mentors showed a strong inclination towards in-person meetings, reflecting an understanding of the limitations of prolonged virtual mentoring. Both groups emphasise structured communication, regular engagement, and accessible support, reflecting a shared commitment to sustaining effective mentoring relationships through unprecedented challenges. This adaptability and commitment underscore the importance of flexible, responsive mentorship programs in higher education, particularly during times of crisis.

COVID-19 influenced the way in which the student's entering university between 2020 and 2021 experience university. Due to restrictions aimed at curbing the spread of COVID-19, most of the university programmes were moved onto an online platform, including peer mentoring. While the peer mentoring programme existed quite efficiently in this virtual space, the peer mentors showed a high level of innovation in facilitate the online mentoring process to effectively work with their peer mentees.

This paper found that the peer mentoring programme followed a Schumpeterian process from the entrepreneurial innovation by the peer mentors to the institutionalisation of this innovation. As such, the peer mentors were able to overcome some of the challenges brought about by the impact of COVID-19 on the learning platform. This induced growth for the peer mentors while helping the peer mentees overcomes many of the challenges too.

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