

Optometry students' attitudes towards research at undergraduate level

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Background. Universities worldwide are required to increase their levels of research productivity.

Objective. To bring about positive changes in research perspectives if the factors contributing to the attitude of undergraduate optometry students can be identified, enhanced and rectified.

Methods. Three nominal group technique (NGT) discussions were conducted with 22 final-year (4th-year) optometry students in central South Africa (SA) to reach consensus on the most important factors that students regarded as influencing their undergraduate research experiences. Data gathering and analysis took place simultaneously, while participants prioritised the data. Data were analysed by *in vivo* coding, and categories were grouped according to themes that emerged from the codes.

Results. Ranking and content analysis of coded statements yielded positive and negative categories, as well as categories with mixed codes. The major factor influencing students' attitudes towards research was administration and the time-consuming nature of their research projects. Recommendations for more effective administration are given.

Conclusions. It was concluded that active steps should be taken by the Department of Optometry, University of the Free State, Bloemfontein, SA, to alter and minimise negative aspects encountered by the students, which could assist future students' experiences of research at undergraduate level.

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During the past decade, increasing pressure has been placed on universities to emphasise research outputs, as it is acknowledged that higher education and the resultant research innovation accomplishments are strategically interwoven.^[1] Through research findings, resources can be utilised more effectively and solutions for local health-based problems can be implemented.

Optometry is a primary healthcare profession and often the first point of contact for many patients. The use of best practice through evidence-based medicine is a trend in many higher education departments.^[2] This is equally true for departments of optometry at institutions of higher education in South Africa (SA).

By identifying factors that contribute towards undergraduate students' attitudes to research, it is argued that a more positive attitude can be developed if positive factors are enhanced and negative factors are rectified. The resultant research may then lead to the advancement of optometric knowledge that could translate into better-skilled practitioners, who may consequently implement better patient care.

Patient care is a focus point of the intended implementation of the National Health Insurance (NHI) in SA. This will result in an increase in the number of optometrists trained, with the ability to use the latest patient care procedures. There is therefore a need for optometric education to evolve through research and evidence-based healthcare methodologies. Consequently, a strong research culture in departments of optometry is imperative.

There is limited information on optometry students' attitudes towards research. Despite similar studies having been undertaken with medical, nursing, chiropractic and social work students in SA,^[2-4] this is the first SA study to address the knowledge gap of optometry students. Students are the future of the profession, and inculcation of a research culture in these students could promote lifelong learning.

Krech and Crutchfield^[5] emphasise the importance of knowing the beliefs and attitudes of people, as it is possible to predict and influence their behaviour. Also, by identifying the attitude towards research, findings can influence how educators teach research, as attitudes cannot be directly observed but can be inferred from individuals' self-reports and behaviour.^[6]

Attitude theory

Historically, the most prominent of the attitude theories has been the tripartite approach, which encompasses emotion, cognition and behaviour. Cognitive origins^[7] encompass processes such as a person developing positive or negative connotations about an object through gaining knowledge. Attitudes may also be formed from the emotional reactions are experienced when exposed to an object. In this model, attitude is manifested as beliefs, feelings and actions.^[8] The cognitive aspect relates to students needing to know and understand the possibilities of conducting research and its use. The affective aspect is equally important, as students need to feel optimistic about and enjoy doing research. The behavioural aspect refers to students attempting to carry out or plan to learn more about research.

With these three aspects as the theoretical foundation, the objective of the study was to identify the factors contributing to final-year students' attitudes towards research in the Department of Optometry, University of the Free State, Bloemfontein, SA.

Methods

Nominal group technique (NGT) discussion sessions were held with students under the supervision of an experienced facilitator. In this study, as per the NGT process, data gathering and analysis took place simultaneously while the participants prioritised the data.^[8] The researcher (LC) used Van

Breda's^[8] guidelines, which recommend a method to analyse multiple NGT sessions and combine the results of these sessions as outlined below. Van Breda's guidelines are well accepted in SA, and follow a step-by-step process, creating clear instructions for repeatability.

Step 1

The facilitator welcomed all the participants. The question was posed to the group, and the facilitator provided brief information about the topic.

Step 2

The participants spent a few minutes writing down their views on the topic or question, and were encouraged to note as many ideas as possible. This was done in silence and had a time limit of 10 minutes.

Step 3

Each participant in turn contributed an idea, which the facilitator recorded on the flip chart. Similar suggestions were grouped together where appropriate. Participants were allowed to skip a turn and then take part again during a later round.

Step 4

The group discussed each of the contributions for clarification. None of the ideas was allowed to be omitted. The discussion proceeded with one item at a time and one person speaking at a time.

Step 5

Participants ranked the ideas by voting for five statements, prioritising their opinions.

Students prioritised the different statements they recorded during the NGT interviews by identifying and scoring the five most important ones, giving a value of 5 to the most important statement and a value of 1 to the statement they regarded as the least important. The votes were summated to obtain the five most important statements. The statement that received the highest score was then ranked number 1, continuing in this way. Consensus was reached in this manner.

When combining the topmost five positive statements from the three groups, the statements mostly related to knowledge gain, the process of research, communicating research results or findings to participants, and aspects of organising and planning the research project. These responses were grouped according to the similarity of the context of the statements.

Each of the statements from the three groups was given a stand-alone code. These codes were then grouped according to their similarity to form a theme. The categories were identified in this way.

This technique gives all participants a chance to voice their opinions. The participants are viewed as experts, as they are expert on how they perceive their experiences. Harvey and Holmes^[9] confirmed the NGT as a reliable method to determine priorities and considered it valid and effective for problem identification.

Sampling

All final-year students were invited to participate. The researcher holds a relativist view and acknowledges that each student might have a different experience of the exposure to research in the Department of Optometry, and might interpret it in a personal manner, which could influence their attitude towards research. For these reasons, the sample size was viewed as sufficient.

Purposeful sampling was used to recruit 22 of the 23 registered final-year (4th-year) optometry students, who were in the process of completing a research project in 2014. Informed consent was obtained through distributing information leaflets regarding the study. Participants had the right to withdraw before they signed letters of consent.

Data collection

Broad questions, typically used in the NGT, were formulated. The questions were constructed to probe any research-related experience of a student.

The facilitator took a few minutes before each session to ensure that the students understood the scope of the questions. These were piloted at the first nominal group session to ensure that there was no ambivalence regarding the questions. Three nominal group sessions were completed ($n=8$, $n=6$, $n=7$). The questions, which were not altered, were as follows:

- What are the positive experiences related to research?
- What are the negative experiences related to research?

As the participating students were required to continue adding statements until all opinions or experiences were listed, completeness/saturation of the data was achieved.

This study also used descriptive coding, which provides the substance of the data, *in vivo* coding that uses verbatim statements, as well as emotion coding.

Results

Of the 22 final-year optometry students who participated in the study, the majority were female ($n=19$; 86.4%), and the mean age of this group was 22 (range 21 - 31) years.

Among the positive statement categories, the following emerged: benefits of research, research process, reflection, group work, gaining information, skills development, participants, supervision and emotion. Statements centred mostly on skill gains; the participants felt they had improved their communication and time management skills, as well as learning to plan and organise themselves.

The statements in Table 1 are the verbatim responses that were recorded from the three groups (indicated by i, ii and iii). The prioritisation is also reflected (1 for the most important), and if one statement received the same number of votes, the numbering was indicated as 4a, 4b, etc.

The negative statements (Table 2) related mostly to the time-consuming nature of conducting research, administrative guidelines or processes in the different departments, resources and the research process itself, emotions elicited and level of satisfaction (or dissatisfaction) with regard to their experiences. Students were aware of the overall emotional and exertional input, and that the return on their investment was negative.

A unique finding was the time-consuming nature of obtaining permission from various offices to gain ethical clearance. Different ethical procedures are required when using patients, students or individuals from the public in research projects.

With the tripartite model of attitude as a reference point, Fig. 1 indicates how each of the categories compiled from the data aligns with one or more of the components of this seminal model of attitude. The overlap of some categories emphasises the complex nature of attitude. These combined valences show that within the affective domain, should the resources in the Department of Optometry improve, the overwhelming feeling of the students would be more positive.

Table 1. The five topmost positive statements from the three nominal group technique groups with regard to their experiences of research

Category	Statement	Group	Final ranking in group
Benefits of research/ reflection/research process	Gaining more information that could possibly help in the future	i	1
Gaining information	Getting more knowledge about the research subject	i	2
	More knowledge related to the study topic	ii	3
	More knowledge about a specific topic	iii	1
Group work	Group work makes the workload during the research process easier	ii	1
Participants/skills development	Personal relationships with participants during the study	ii	4
Research process/skills development	Improving research techniques and methods	i	3
	How to format a research question	i	5b
Research process	Knowledge about the research process	iii	2
	Understanding the concepts of what research is all about	iii	4
Skills development/resources	Where to find accurate information	i	4a
Skills development	Improvement of communication skills	i	4b
	Teaches you to organise and plan information	iii	3
	Learn to plan time more effectively	iii	5
	Teach others the new information found	i	4c
Skills development/participants	Positive experience to convey knowledge to participants	ii	5
Supervision	Good guidance of a study leader/supervisor	ii	2
Emotions	Feeling valuable	i	5a
	Build up confidence	i	5c

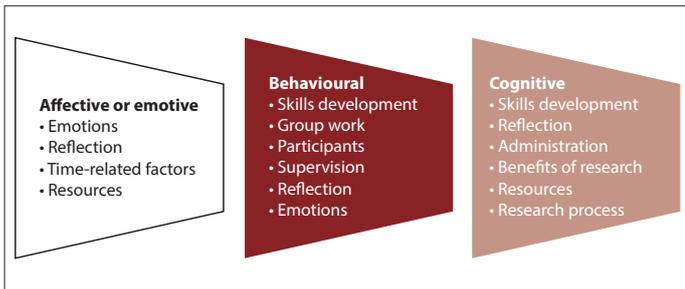


Fig. 1. Categories identified in the nominal group technique discussions aligned with the tripartite model of attitude.

The behavioural component demonstrates how the students developed and matured. Participants acknowledged a broad range of skills that they felt had improved, including learning to deal with difficult interpersonal situations with group members and participants.

The cognitive aspect specifies the higher-order thinking of linking theory to practice, understanding the limitations of the study and the benefits of what research could mean to them as individuals, the profession and their patients.

The category of reflection spanned all three components of the tripartite model of attitude, from having a humble outlook, to altering behaviour, to co-operating with each other for the greater good of the team.

Discussion

This study revealed a cluster of negative statements related to the administrative concerns of the students. This finding has resulted in recommendations being made to the department (Table 3).

Similar results were found in previous studies,^[10-14] whereby benefits that accrued to students who performed research had a positive effect on their view of research in general. These benefits included a more positive attitude towards research,^[10,12] increased interest in research,^[10,12]

a better understanding of research design^[11] and being more curious about research.^[12]

Research-related activities were also improved, such as the students' skill level at library research skills development of research questions and hypotheses,^[12] a greater understanding of data interpretation and the use of statistics in research,^[11,12] as well as a better grasp of referencing.^[12]

Students perceived improved abilities in workplace skills. Participants mentioned creative thinking skills, application of ethical principles, computer-based knowledge and skills,^[12] oral presentation skills, organisational skills and time management skills.^[12,13] During the research process, students realised the importance of good time management, as well as learning to communicate well with others and share the workload. All of these skills lean towards flexibility, which is a sought-after quality in the working environment.

The main negative aspect reported was the time-consuming nature of the research project owing to students being in different clinic groups. In 2015, the students were deliberately placed into clinic groups that matched their research project group. This allowed the students to have more time together to collate data.

There were aspects where the Department of Optometry was perceived by the students as faring well:

- presentations at annual faculty conferences
- group work for research assignments
- exposure to new equipment
- earning credits towards one's degree upon completion of the project
- exposure to the literature as a source of learning
- having an online arena for student discussions.

Therefore, there are a number of aspects of the optometry programme that are being implemented correctly.

The NGT discussions yielded valuable recommendations that, if implemented, would have the ability to instil a stronger research culture in the department.

Table 2. The five topmost negative statements from the three nominal group technique groups with regard to their experiences of research

Category	Statement	Group	Final ranking in group
Time related	Time consuming	i	1
	Time consuming	ii	2
	Time consuming	iii	4
Time related/administrative	The process to obtain permission is time consuming	ii	2
	Lack of resources	i	2
Resources	Use of University of the Free State facilities increases the costs	iii	3
	Ignorance relating to the administrative process during the research process	ii	3
Administrative	Poor guidelines relating to the module	ii	4
	No allocated time for research in the programme	iii	1
	Uncertainty about the administrative processes	iii	5b
Administrative/time related	The length of time the module takes (2 years)	iii	5a
Reflection	Missing data make analysis difficult	i	4
	Too complicated research question	i	5b
Participants	Subjects unwilling to participate	i	5a
Participants/emotions	Unwillingness of participants during the selection process	ii	5
Emotions	Stressful	i	3
	What you put in is more than you get out	ii	1

Table 3. Recommendations: modification of current status

Current status	Statement	Proposed change	Possible benefits
No protocol of communication between the departments involved in the research project	Poor guidelines relating to the module; uncertainty about the administrative processes	Formalised line of communication Drafting of rubrics for the presentation and the article to be submitted; these are to be included in the module guide	Minimise time delays, reduce confusion and ambiguity of assessment Smoother planning for meeting outcomes
No formal schedule or responsibilities of team members delineated	Ignorance relating to the administrative process during the research process	Clear guidelines on deadlines and meetings with the supervisor A timeline for the study is to be included in the supervisor-student contract and responsibilities made transparent in this agreement	Leadership and commitment from both parties Accountability from members
Research performed throughout the final year, as it suits the group members	No allocated time for research in the programme	Allocated week to perform research Groups for the research project share the same practical schedules	Shorter time span Concentrated effort allows for continuity of the research mindset Fewer clashes in the timetable, which allows for passive group members
Students from various practical groups in the research group			Less hassle for students to meet Fewer delays in the implementation of the research project

Conclusion

The key recommendations resulting from the findings of the study were to implement policies in the Department of Optometry for better communication with students. Recommended strategies include the following:

- allow students to choose their own groups within their clinic schedule
- more dedicated research time in the schedule
- provide guidelines that require the project to meet technical aspects of publication standards
- quality assurance policy on supervision
- workshops on writing for students to learn to compose research articles
- share supervision with a senior researcher from a different department
- allow staff to attend supervision workshops.

The new research module comprises eight credits. The outcomes provide a platform for greater emphasis on and importance of exit-level requirements.

This study identified various factors that final-year students in the Department of Optometry, University of the Free State, experienced positively and negatively in relation to the contribution of their attitude towards research.

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