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Locus of control profile in
anaesthetic nurse and theatre
nurse students: A recruiting
guideline?

Abstract
In the Netherlands, an individual
with or without a nursing background
can enrol in a nurse anaesthetist or
theatre nurse program. Admission
to the program requires either a
secondary school diploma with a
specialisation in physics and health,
or a nursing degree. At the end of
the study, the Dutch anaesthetic
nurse is comparable to a nurse
anaesthetist in other countries while
theatre nurses are similar in scope
of practice to scrub/scout nurses in
other European countries. Retention
of students is challenging, with an
attrition rate of around 24 per cent
adding to the cost for hospitals
delivering the program. Identifying
ways to improve the efficiency of
program delivery through enhanced
student retention is a key priority
for hospitals delivering this program.
In this study, a longitudinal survey
design was used to investigate
student perceptions of their locus
of control, a concept which is linked
with motivation, persistence and
achievement in study and work. Data
was collected from a sample of 100
students over a five-year period in
the Netherlands.

Introduction
Success of students depends
primarily on factors such as language
aptitude, motivation, anxiety and
personality. In 1962, Rotter et al.
developed the concept of ‘locus
of control’ and a few years later
published a validated internal–
external (I–E) scale for measuring
this personality trait – the so-called
Rotter’s IE Control Scale. Locus
of control is a psychological social
learning theory that refers to the
to extent to which individuals perceive
control over their lives and their
environment. People assigning
control of events to themselves
are said to have an internal locus
of control and are referred to as
‘internals’. They believe that the
outcome of their actions results from
personal efforts, abilities, mood or
permanent characteristics. People
who attribute control to outside
factors are said to have an external
locus of control and are termed
‘externals’. Externals ascribe success
and failure to factors such as luck,
coincidence, fate, task difficulty,
circumstances, teacher bias or the
influence of others.

In education, locus of control
typically refers to how students
perceive the causes of their academic
success or failure in school. The
locus of control has a powerful effect
on academic motivation, persistence
and achievement throughout
schooling. Internals assign their level
of success to effort so are likely to
work harder and are less affected by
workload-induced stress, whereas
externals find working hard worthless
because they assign success to
external influences. Internals prefer
situations where control is possible.
When performance is poor, internals
blame themselves, show a decrease
in self-esteem and higher levels of
anxiety than externals. Externals are
less attracted to achievement-related
tasks, as failure is more likely to be
attributed to the kind of task and luck\textsuperscript{6}.

Students with a belief in internal control are more likely to change their behaviour following positive or negative reinforcement than students with a belief in external control. This makes internals more proactive. However, behavioural change only occurs if the reinforcement is of any value for them. Externals seem to change behaviour easily, as they do not see it as a primary source for altering reinforcements\textsuperscript{6}.

The goal of this study was to examine the relationship between the learning curve of anaesthetic nurse and theatre nurse students, and their locus of control personality. The learning curve was defined as the level of knowledge assessed by exams and progress tests and the time it took them to achieve sufficient knowledge. The result, a locus of control profile, can be used for recruiting and selecting potentially successful anaesthetic nurse and theatre nurse students, and gives teachers the opportunity to adjust their teaching to the needs of the student.

### Method

#### Sample and procedure

Over a period of five years (2010–2015), this longitudinal survey study was performed among Dutch anaesthetic nurse and theatre nurse students. Firstly, in 2009 at Fontys University, Eindhoven, we studied a pilot group of anaesthetic nurse students only. After the pilot, students from both the theatre nurse course and the anaesthetic nurse course at the same university were studied. The study included three separate cohorts of anaesthetic nurse students and theatre nurse students each enrolled for a duration of three years. The study was approved as a quality assurance undertaking by Fontys University before data collection commenced.

Initially, all students were informed about the study and invited to participate. Students who agreed to participate were asked to fill in the locus of control test (LOC test) and demographic characteristics were collected. LOC test results and the demographic characteristics were collected by the secretary of the university. Individual participant responses were assigned a unique individual identifier and the anonymous data was analysed by the researchers. The LOC test was repeated every study year as a control measurement. Depending on their LOC test score students were classified as internals or externals. Students were informed they could withdraw from the study at any time.

#### Measures

Anaesthetic nurse (AN) and theatre nurse (TN) students were tested on all relevant competencies and knowledge across several domains of knowledge (as described below); however, testing was undertaken with each cohort to ensure role-specific content could be assessed.

The domains of knowledge were:

- Social interaction and cooperation: i.e. demonstrating behaviour in a deliberate and professional manner, whereby the intention of the action is clear to all parties.
- Care provision in an operating theatre complex: i.e. providing independent nursing care to individual care requirements for care recipients during the perioperative phase.

### Table 1: Demographic characteristics

<table>
<thead>
<tr>
<th></th>
<th>Internal ($N = 19$)</th>
<th>External ($N = 72$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>theatre nurse / anaesthetic nurse</td>
<td>9 (47%) / 10 (53%)</td>
<td>38 (53%) / 34 (47%)</td>
</tr>
<tr>
<td>female/male</td>
<td>17 (89%) / 2 (11%)</td>
<td>55 (76%) / 17 (24%)</td>
</tr>
<tr>
<td>previously obtained nursing degree / no previously obtained nursing degree</td>
<td>7 (37%) / 12 (63%)</td>
<td>34 (47%) / 38 (53%)</td>
</tr>
<tr>
<td>previous relevant training / no previous relevant training*</td>
<td>5 (26%) / 14 (74%)</td>
<td>21 (29%) / 51 (71%)</td>
</tr>
<tr>
<td>mean age of participants (SD)</td>
<td>24.16 (6.16)</td>
<td>24.46 (6.19)</td>
</tr>
<tr>
<td>number of students who dropped out of the course during second or third year</td>
<td>6 (39%)</td>
<td>12 (22%)</td>
</tr>
</tbody>
</table>

*Diploma or degree obtained in a health care profession other than nursing but related to perioperative care.
Results

Out of 104 students enrolled in the course over the study period, 100 individuals elected to participate (participation rate = 96 per cent). In total, ten students skipped a training year (accelerated study) and 26 students failed to complete the entire course. Of these 26 students, nine students dropped out during the first year of training. Their results were not included in the study because the data was too limited to analyse. Only students who dropped out in their second or third study year were included in the study. The study therefore included responses from 91 students – 19 internals and 72 externals and this data was analysed.

For each demographic characteristic there were equal numbers of students with internal and external focus (Table 1). Internal participants had a mean age of 24.16 years (SD = 6.16), while the mean age of externals was 24.46 years (SD = 6.19). We found no statistical difference between the progress test scores for knowledge or time of students with an internal focus and those with an external focus.

Because of the high incidence of dropout (in total 26 per cent), we checked for differences between students that completed the course and those who dropped out. An independent t-test was used to determine any differences in progress test scores for knowledge and time between students who completed the course and students who dropped out in the second or third study years (Tables 2a and 2b). There was a significant difference in the time taken to achieve sufficient knowledge for progress tests 1, 2, 5 and 6. There was no significant difference in knowledge scores.

Statistical analyses

All data was collected in an Excel file and transported to SPSS for analysis. The independent variables (predictors) are demographics and study results. The dependent variable (outcome) is the locus of control profile. A chi-squared test was performed to determine if there were equal numbers of students with internal and external focus for each demographic characteristic. Then an independent T-test was used to determine any difference in study results between both LOC groups (SPSS 20.0 system, SPSS Inc, Chicago, Ill, USA). P < 0.05 was considered statistically significant.

• Professional skills: i.e. analysing, interpreting, evaluating and assessing the full range of care and justifying decisions.
• Organisation and professionalisation: i.e. establishing and coordinating actions that facilitate safe and proficient care.
• Technology: i.e. using technology, equipment, materials and tools to deliver safe and proficient care.
• Mentorship: i.e. supervising trainees or students in accordance with the curriculum.
• Teamwork: i.e. interacting with other professionals to deliver safe and proficient care.

Competency was assessed at five levels with increasing complexity and decreasing supervision, as follows:

- Level 1 is low complexity and direct supervision
- Level 2 is low complexity and indirect supervision
- Level 3 is moderate complexity and autonomous
- Level 4 is average complexity and autonomous
- Level 5 is high complexity and autonomous.

Students’ overall knowledge was assessed every semester in a progress test. There were six tests, two in each year of the course. Each student needed to obtain a positive progress test result before they could proceed to the next study phase. Progress testing is a way to predict future competence and performance. It is based on subsequent equivalent tests to determine the growth of functional knowledge for each student. This then enables more reliable and valid decision making about promotion to the next study phase and discourages ‘binge’ learning. It measures the student’s improvement in relation to their syllabus. It is a rich source for continuous benchmarking and quality improvement.

Students received two scores from their progress tests – one that indicated their level of knowledge and the other that indicated the time it took them to achieve sufficient knowledge. The knowledge scores were 1 (sufficient), 2 (more than sufficient) and 3 (good). A date was set for every progress test based on what was regarded as the ‘standard’ time: students who passed the test on this date scored 0, students who were unsuccessful and needed to redo the test were defined as needing more time and scored 1 while students who successfully completed the test before the set date were defined as needing less time and scored -1.

Progress tests also assessed students’ level of competency and a student could obtain a positive result for more than one level at a time. For instance, a student deemed to be at competency level 3 would get a time score of 0 for level 2 and -1 for level three.

Out of 104 students enrolled in the course over the study period, 100 individuals elected to participate (participation rate = 96 per cent). In total, ten students skipped a training year (accelerated study) and 26 students failed to complete the entire course. Of these 26 students, nine students dropped out during the first year of training. Their results were not included in the study because the data was too limited to analyse. Only students who dropped out in their second or third study year were included in the study. The study therefore included responses from 91 students – 19 internals and 72 externals and this data was analysed.

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Discussion

The goal of this study was to examine the relationship between the learning curve of anaesthetic nurse and theatre nurse students and their locus of control personality.

In this study, we did not find any statistically significant differences in progress test scores between students with an internal locus of control and those with an external locus of control. By contrast, a study by Gifford et al. encompassing 3066 college students indicated that students with an internal locus of control have higher grade point averages, while those with an external locus of control have lower grade point averages and higher risk of dropping out. According to April, this may be associated with the high level of proactivity among internals and quitting was perceived as the best option. Our study showed that students who dropped out of the course took significantly longer to achieve sufficient knowledge for progress tests 1, 2, 5 and 6 than students who finished the course successfully. This evidence can be used to predict dropout in an early phase and should be an early warning sign for student, teacher and hospital facilitators.

According to Bedel, in general, female students have significantly higher scores for locus of control which means they are more internally focused. In our study, we found that only 17 of 72 females (24 per cent) had an internal focus. Ghonsooly et al. studied the locus of control and learning results of students in three fields studying a general English course and found significant differences. Engineering students were significantly more internally focused than Science and Humanities students, and achieved higher results. Our finding was in line with this as 79 per cent of the nursing students were externally focused. Nursing, especially within operating theatres, can be regarded as a combination of science and humanities.

Limitations

This study had several limitations.

- We studied students from one educational institution only.
- We did not collect data determining the reasons for student attrition. Negative study results and other expectations from work and personal life changes may be reasons to dropout.

Table 2a: Mean time scores for students who completed the course and received their diploma (Group 1) and students who stopped prematurely and didn’t receive a diploma (Group 2)

<table>
<thead>
<tr>
<th>Progress test</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>t (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
<td>72</td>
<td>-0.06</td>
<td>0.23</td>
<td>17</td>
<td>-0.12</td>
<td>0.33</td>
<td>87***</td>
</tr>
<tr>
<td>Test 2</td>
<td>72</td>
<td>-0.11</td>
<td>0.33</td>
<td>17</td>
<td>0.35</td>
<td>0.86</td>
<td>87</td>
</tr>
<tr>
<td>Test 3</td>
<td>72</td>
<td>-0.21</td>
<td>0.88</td>
<td>11</td>
<td>0.33</td>
<td>0.88</td>
<td>83</td>
</tr>
<tr>
<td>Test 4</td>
<td>72</td>
<td>-0.14</td>
<td>0.90</td>
<td>11</td>
<td>0.27</td>
<td>0.79</td>
<td>80</td>
</tr>
<tr>
<td>Test 5</td>
<td>72</td>
<td>-0.27</td>
<td>0.83</td>
<td>5</td>
<td>1.00</td>
<td>0.00</td>
<td>69.000***</td>
</tr>
<tr>
<td>Test 6</td>
<td>72</td>
<td>-0.16</td>
<td>0.92</td>
<td>3</td>
<td>1.00</td>
<td>0.00</td>
<td>67.000***</td>
</tr>
</tbody>
</table>

Time to achieve sufficient knowledge: less time (-1), standard (0), more time (1). Significant correlation at level *p< 0.05, **p< 0.01, ***p< 0.001.

Table 2b: Mean knowledge scores for students who completed the course and received their diploma (Group 1) and students who stopped prematurely and didn’t receive a diploma (Group 2)

<table>
<thead>
<tr>
<th>Progress test</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>t (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
<td>72</td>
<td>2.21</td>
<td>.60</td>
<td>17</td>
<td>2.12</td>
<td>.69</td>
<td>.541</td>
</tr>
<tr>
<td>Test 2</td>
<td>72</td>
<td>1.97</td>
<td>.65</td>
<td>17</td>
<td>1.82</td>
<td>.64</td>
<td>.852</td>
</tr>
<tr>
<td>Test 3</td>
<td>72</td>
<td>2.05</td>
<td>.66</td>
<td>11</td>
<td>2.00</td>
<td>.45</td>
<td>.264</td>
</tr>
<tr>
<td>Test 4</td>
<td>72</td>
<td>1.92</td>
<td>.65</td>
<td>11</td>
<td>1.90</td>
<td>.88</td>
<td>.068</td>
</tr>
<tr>
<td>Test 5</td>
<td>72</td>
<td>1.86</td>
<td>.62</td>
<td>3</td>
<td>2.00</td>
<td>.71</td>
<td>.497</td>
</tr>
<tr>
<td>Test 6</td>
<td>72</td>
<td>1.66</td>
<td>.68</td>
<td>3</td>
<td>2.00</td>
<td>1.00</td>
<td>.826</td>
</tr>
</tbody>
</table>

Level of knowledge: sufficient (1), more than sufficient (2), good (3).
• We were not able to assess the students during their clinical placements.

• The number of participants, especially the number of students with an internal locus of control was limited. However, the ratio of people with an internal locus of control to those with an external locus of control among the overall workforce is unknown and may or may not be reflective of the ratio reported in this study.

Conclusions

Locus of control had no influence on the learning curve of students, neither exam and progress test results nor time it took for students to complete the course. Importantly, a high level of student drop out (26 per cent) was seen during the course. Further study is necessary to determine why this attrition occurs and how to reduce it. The time taken for students to achieve sufficient knowledge at different stages of the course was a good indicator for the success rate in finishing the course. The data is insufficient to determine whether personality traits can be used to determine optimal student recruitment to perioperative programs of education.

References


