

# Pharmacy educators' views on graduate attributes and case-based learning in an undergraduate degree

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## Highlights

- Graduate attributes should encompass a dynamic interaction of knowledge, skills, abilities and professional identity and roles
- CBL needs to be revisualized as dynamic and integrated with other active learning strategies, rather than a single strategy
- A shift from epistemological and practical knowledge to developing professional ways of being is needed within higher education

## Abstract

### *Background and purpose:*

The nature, form and process of activating graduate attributes is an expanding research focus within the field of professional education. The focus on graduate capabilities has led to higher education institutions interrogating current curricula practices with a view to exploring innovative ways to transform curricula and pedagogy. This article explores pharmacy educators' views on which graduate attributes are important and investigates the role of case-based learning (CBL) in developing graduate attributes in a single university program.

### *Educational activity and settings:*

This qualitative study is based on data drawn from reflective interviews with pharmacy educators on graduate attributes and from document analysis. The data were analysed against a framework of graduate attributes which are grouped into three domains encompassing knowledge and action, as well as construction of graduates' identities as members of a profession.

*Findings and discussion:* The graduate attributes identified by pharmacy educators resonate with the extant literature, organizational policy documents and the professional council's accreditation framework. The domains of knowledge (Domain 1) and possessing and displaying (Domain 2) are sufficiently addressed in the curriculum. However, engagement with identity construction and roles and responsibilities (Domain 3) appear relatively less-developed through CBL.

*Summary:* Whilst CBL in its current form exhibits limitations with regard to developing Domain 3, it has the potential to develop this through greater integration of CBL and

Interprofessional Education (IPE), as well as making graduate attributes more explicit within the curriculum.

Keywords: attributes; case-based learning; curriculum; pharmacy education

## **Background and purpose**

Universities are under increasing pressure to produce graduates with the range of attributes required for their chosen professions. Graduate attributes include the qualities, skills and understanding students should develop during their academic years of study in an accredited program, which shape them in their professional lives.<sup>1</sup> For the purposes of this article, they encompass more than just disciplinary knowledge and skills and include the personal attributes, understanding, reflective capacity and the role and identity of practising pharmacists.<sup>1-2</sup> Attributes considered desirable in health care also include adaptability in a changing environment, capacity for independent learning for life and a caring and compassionate nature.<sup>3</sup> Furthermore, studies have highlighted the need for professional pharmacists to be educators, team-players, researchers, decision-makers and reflective practitioners.<sup>3</sup>

In responding to demand for healthcare graduates who are ready for professional practice, the learning outcomes for health professions and university undergraduate programs are generally defined by professional competency frameworks.<sup>4</sup> In South Africa, the design of curriculum programs is guided by competency frameworks and the regulations regarding professional conduct set by professional councils. The pharmacy curriculum across South African institutions offering the Bachelor of Pharmacy degree (B. Pharm) comprises of four years' full-time study followed by a year of internship and thereafter community service. In addition, pharmacy education is guided by critical cross-field outcomes set by the South African Qualifications Authority (SAQA)<sup>5</sup> as national educational benchmarks. Graduates are required to demonstrate life-long learning, critical thinking, effective and professional communication and integration of knowledge.<sup>6</sup> Emphasis is also placed on graduates becoming researchers.<sup>7</sup>

Studies on graduate attributes within a pharmacy context have largely focused on the perspectives of employers, practising pharmacists and recent graduates in the work environment.<sup>3,8-9</sup> There has been limited research from an educator perspective, warranting a study of this nature. Nationally and internationally, higher education institutions are under increasing pressure to ensure that students' learning experiences contribute to developing and cultivating the knowledge and attributes required for the 21<sup>st</sup> century.<sup>3</sup> Current, dominant university pedagogical practices are regarded as insufficient to develop these attributes because the subject matter is often compartmentalized and students largely work individually and competitively.<sup>10-11</sup> Pharmacy educators are also being challenged to develop graduates who can adapt to complex situations and respond effectively to new and ever-changing environments.<sup>10-11</sup> Mylrea et al.<sup>12</sup> call for educators to examine ways to achieve professional socialization of students, with an emphasis on who the student is becoming. It is believed that such identity formation will prepare them for the challenges they will face in work contexts.

In pursuit of developing more socially and clinically-oriented pharmacists, higher education has witnessed a shift from traditional purely didactic forms of teaching. Pharmacy educators are using Case Based Learning (CBL) to complement traditional pedagogical approaches in

order to promote collaborative learning and higher order thinking.<sup>13</sup> CBL also offers exposure to teaching and learning activities that reflect students' future professional working roles.<sup>14</sup> The Accreditation Council on Pharmaceutical Education's (ACPE) standard 11.2 specifically refers to CBL, promoting this active-learning strategy.<sup>15</sup>

There is no universal definition of CBL and delving into the subtle differences in its description is beyond the scope of this article. For the purposes of this study, CBL refers to a pedagogical approach where students use authentic clinical cases to solve clinical problems in small groups.<sup>16</sup> It offers them the opportunity to discuss and debate issues, but within a structured approach to problem-solving.<sup>16</sup> While pharmacy educators have incorporated CBL in the curriculum to complement traditional teaching methods, there is a paucity of research on whether this is developing the attributes required by professional pharmacists.

The first section of this article highlights the theoretical framing that guided the study, followed by the methodological approach employed. Thereafter the findings are presented and the discussion compares the field data with the theoretical framework.

This article foregrounds the following critical research questions:

1. What attributes do pharmacy educators regard as important for professional pharmacists?
2. Why do pharmacy educators use CBL as a pedagogical approach to develop such attributes?
3. What are the strengths and limitations of CBL in developing professional pharmacists?

The data obtained from interviews with pharmacy educators were used to address research questions 1 and 2, while interview data and document analysis (such as outlines, lecture notes and tests) were used to answer research question 3.

### ***Theoretical framing***

This article examines pharmacy educators' views on graduate attributes and classifies them according to Barnett's<sup>17</sup> framework. The attributes identified by educators are organized into one of three domains, namely, *knowledge, possessing and displaying* and *being*. The knowledge domain (Domain 1) speaks to the propositional content of the discipline which subject specialists usually advocate and assess as the main kind of knowledge that graduate professionals should develop. These are often used as criteria for accrediting programs and as exit level outcomes of the discipline's official curriculum documents<sup>15</sup>. However, it is important for students to engage with and process this knowledge. *Possessing and displaying* attributes (Domain 2) refer to the skills and actions of doing; active practice of the knowledge of a particular discipline.<sup>17</sup> The third domain, *being* involves more than knowing and doing and refers to a conceptualization which goes to the heart and identity of being a professional.<sup>17</sup> This involves engaging the self in relation to the contextual specificity as a member of the profession. This domain embeds the tacit characteristics of attributes which involve individuals making ethical and moral choices. In their curriculum design and pedagogy, professional qualifications such as pharmacy should be characterized by a high degree of interaction amongst the three domains. This article's critical questions focus on the case of pharmacy but could be applied to the graduate attributes being developed across other disciplines in the health sciences, natural sciences or social sciences.

## **Educational activity and settings**

This research is located within a qualitative methodology and an interpretivist paradigm. The study explored pharmacy academics' views on which attributes graduates should possess and which of these are being developed using a CBL approach. A framework that reflects on professional educational curriculum theories was used. The four majors: pharmacology and applied therapeutics, pharmaceutical chemistry, pharmaceuticals and pharmacy practice as prescribed by the South African Pharmacy Council (SAPC)<sup>18</sup> were selected for investigation. These majors were explored within a single university, the University of KwaZulu-Natal (UKZN) as a case study to explore the attributes. This study draws on the tradition of case study research, where the aim is not to generate universally generalizable truths; instead the goal is to provide a small preliminary study in which to activate generatively the kinds of further areas for further reflection and research.<sup>19</sup> The case study research design privileges generative depth rather transferable breadth.

### ***Selection of the pharmacy curriculum***

The B. Pharm offered by different South African higher education institutions has a similar first year structure, with pure science or applied science modules forming the foundation. Depending on the institution, computer science, language modules (English, isiZulu or Xhosa) and/or community-based modules are also incorporated. Human behavior or psychology modules are also included within the curriculum but to a lesser degree. During their undergraduate program, students are placed for professional practice in a community, hospital or industrial pharmacy.<sup>20</sup> In accordance with SAPC guidelines, the four majors are compulsory across all South African institutions.<sup>18</sup> Therefore these majors were selected for this study. Due to the large number of modules offered across the years of study for the pharmacy degree, a subset was selected, focusing only on majors in years three and four. Year one of the curriculum was excluded as the modules comprise mainly of general science or service modules taught by lecturers from disciplines outside the School of Pharmacy. Internship and community service (years five and six, respectively) were also excluded as they occur outside the four-year undergraduate degree.

Although CBL is employed in many of the majors, this study explores CBL within one of the majors, pharmacology as CBL is employed in third and fourth year. In addition, academics teaching pharmacology at the institution have adapted many sections which were previously taught didactically, to CBL.

### ***Selection of participants and data collection and analysis***

All UKZN educators teaching the majors in years three and four of the B. Pharm curriculum were selected. A total of six educators participated in the study, five of whom used CBL and one who did not. Two educators participated from pharmacology, two from pharmaceuticals, one from pharmacy practice and one from pharmaceutical chemistry. Three of these educators were employed at a senior lecturer level and three at a lecturer level. Pseudonyms (letters of the alphabet) were used to maintain anonymity and confidentiality.

The interviews were semi-structured and lasted for approximately an hour. All interviews were audio recorded and transcribed by the researcher. The outlines for each of the modules under study were reviewed along with relevant documentation pertaining to the module, such as lecturers' slides and notes, student lecture notes, and case studies (used in lectures, tests and exams). The data obtained from the interviews and various documents were coded manually using content analysis, which involved categorising the data, and creating labels

and codes. The codes were grouped into themes, summarized and interpreted. The codes and themes were verified by a second researcher.

## Findings

### *Attributes identified as important by pharmacy educators*

The graduate attributes educators regarded as important are listed in Table 1. These included knowledge, skills (interpersonal, communication, and research skills), and personal characteristics (ethics, empathy, and life-long learning). This study found strong similarities between the graduate attributes identified by educators teaching at the university and those identified in the literature and national and international frameworks and policies.<sup>21., 22., 23.</sup> The attributes will later be discussed according to the domains in which they feature.

**Table 1.** Graduate attributes identified by pharmacy educators mapped against Barnett's<sup>17</sup> domains

Graduate attributes identified by pharmacy educators Domains	Barnett's
Knowledge and application	1
Communication skills	2
Interpersonal skills	2
Research skills	2
Confidence	3
Ethics	3
Empathy	3
Professionalism	3
Life-long learner	3

### *Why educators use CBL*

The findings revealed that CBL had been implemented across pharmacology, pharmaceutical chemistry, and pharmacy practice, but not pharmaceuticals (Table 2). The type of CBL and how cases were used varied amongst the pharmacy modules offered. Pharmacy educators' reasons for using CBL are discussed within each of the majors in the discussion section.

**Table 2:** Participants who used/did not use CBL in their 3<sup>rd</sup> and 4<sup>th</sup> year pharmacy modules

Pharmacy modules using CBL		Description of type of CBL used	Pharmacy modules not using CBL	
Year 3				
PHRM 301	Pharmacology	Clinical CBL	PHRM 321	Pharmaceuticals
PHRM 311	Pharmaceutical chemistry	Drug design and development		
Year 4				
PHRM 401	Pharmacology	Clinical CBL	PHRM 421	Pharmaceuticals
PHRM 433	Pharmaceutical practice	Clinical and ethical CBL		

CBL = case-based learning

### *Strengths and limitations of CBL*

Generally, clinical cases are presented in lectures or tutorials as a group exercise or in conjunction with take home tasks allowing students time and space for research. Cases are covered following particular section/s where students acquire the foundational knowledge and concepts in a structured manner. Cases were generally semi-structured and display the patterns highlighted in Table 3.

**Table 3:** Clinical cases and the domains

Patterns of cases	Content and application	Domain
Background and patient history	Personal details such as age, gender, previous medical conditions and information pertaining to the patient's occupation.	Domain 1
Symptoms encountered	Description of symptoms, length of time experiencing symptoms and/or examination of physical symptoms (in the case of a rash). Vitals (blood pressure and sugar readings) are also checked and recorded.	Domain 1 Domain 2
Diagnosis	Evaluating symptoms in line with possible causes.	Domain 1 Domain 2 Domain 3
Treatment options	Decision-making Drug therapies Non-drug therapies and options Patient care and education	Domain 1 Domain 2

## Discussion

### Attributes identified as important by pharmacy educators

#### *Knowledge (Domain 1)*

All the participants highlighted the importance of disciplinary knowledge and its application in practical settings. This domain is also part of the SAPC exit level outcomes and features in the literature.<sup>24-26</sup> The goal of teaching and learning is not only disciplinary knowledge but transferability from one context to another. This occurs in interactive spaces where knowledge is recontextualized from one setting to the next.<sup>22</sup> Shulman<sup>27</sup> speaks of movement between theoretical knowledge and practical clinical knowledge, highlighting that professional development goes beyond content or practice. True professionals go beyond knowledge and practice to incorporate a sense of personal and social responsibility. There is a move towards outcomes in the affective domain, which seeks to define the more intangible qualities that are considered important for pharmacy practice and for graduates to become successful pharmacists.<sup>23</sup>

#### *Possessing and displaying attributes (Domain 2)*

Pharmacy educators at UKZN also identified communication and interpersonal skills, research, and life-long learning skills as important skills (Table 1). These skills and abilities are also consistent with numerous official exit outcomes and competency frameworks. Pharmacy education has a growing number of frameworks to define the core domains of knowledge and skills which students should possess.<sup>22</sup> Aretz's<sup>28</sup> table on global physician competencies covers many of these themes, namely, skills in communication and interpersonal relationships, problem-solving, and being a team player. While most of the attributes identified with regard to skills are consistent with the literature, policies, and frameworks, this article argues that a generic understanding of graduate attributes is insufficient, and that deeper interrogation is required of what such attributes mean within a pharmacy context. Jones<sup>29</sup> also cautions against adopting a simplistic approach to developing graduate attributes and viewing generic competencies as skills independent of context.

### ***Self (Domain 3)***

The third domain of professionalism, ethics, empathy and being an educator which refers to the self and the type of graduate that is being developed was also highlighted by the lecturers (Table 1). These attributes are also consistent with national and international frameworks<sup>30</sup>, policies, governing bodies and research. The importance of ethics and empathy in developing the professional pharmacist has been identified within global competency frameworks, and is also a key concept within the communicator role in the Canadian Medical Education Directives for Specialists (CanMEDS) Framework.<sup>31</sup> Several studies<sup>21,32</sup> have shown that students regard empathy and understanding as key when counselling patients and clarifying their symptoms for proper diagnosis. Together with social responsibility, team work and leadership, empathy has also been cited as being crucial to the development of professional clinicians. Brown<sup>33</sup> asserts that IPE increases students' ability to demonstrate empathy with patients.

Participants in this study also felt that being a researcher and independent learner are important graduate attributes. "They are learning now and in three years they are out there and things have changed already, so if you can instill in them that they are life-long learners, I think for me that's the most important that they become life-long learners." (Participant Z).

### **Reasons educators use CBL**

The type of CBL used varied amongst modules (Table 2), which is not surprising as CBL is defined in numerous ways depending on the discipline and the type of case employed.<sup>34</sup> The decision to use CBL may be linked to disciplinary content knowledge. Participant A, who teaches third year pharmaceuticals, was of the view that the technical and factual nature of the disciplinary knowledge does not lend itself to CBL. Pharmaceuticals has a strong industrial slant and is heavily content driven, focusing on microbiological processes and procedures such as sterilization and staining techniques. This could possibly account for why a CBL approach is not being adopted.

CBL was, however, used in pharmaceutical practice, where students were provided with cases and research around sensitive and ethical issues. CBL also included elements of role-playing, discussions, and debates. Pharmaceutical practice covers ethics, human interactions, and uses scenarios, possibly accounting for the easier implementation of CBL.

With the growing emphasis placed on pharmacists being members of health care teams, there is a need for greater interaction between pharmacists and other healthcare professionals and patients.<sup>34, 37-38</sup> Cases can include interaction with other health professionals throughout students' training in order to prepare them for an integrated model of collaborative clinical care when entering practice.<sup>22,24-25</sup>

CBL in pharmaceutical chemistry was more project-based and required knowledge from previous sections covered in the academic year. The case used for CBL focused on drug design and development. Participant L used CBL for the integration of knowledge and to strengthen the link between theoretical knowledge and its practical application. Most educators that participated in the study also described CBL as "application of theoretical knowledge."

Cases in pharmacology were largely clinically driven and involved diagnosis and treatment of diseases and illnesses. Participant N commented that the content knowledge lent itself to the use of CBL, stating "The good thing about that module is that it has to do with central nervous system pharmacology and obviously one can build it around a lot of case studies from epilepsy, depression, Alzheimer's disease. So it's all your major diseases...it wasn't really necessary for me to do the traditional didactic teaching."

CBL has contributed to changes in clinical practice and teaching methodologies in the medical and pharmaceutical sciences,<sup>24</sup> leading to more integration and thus blurring the lines between theory and practice. An example is educators combining pharmacological concepts pertaining to diagnosis, prevention, and treatment in a holistic approach in preparing pharmacists for professional training.

Participants also used CBL to prepare students for the working environment. Professional education has been affected by the notion of “authentic” learning that posits that in order for students to transfer their knowledge to contexts beyond the classroom, learning tasks should be set that represent the realities of practice.<sup>6,35</sup> One of the benefits of CBL is the use of authentic cases that increase the chances of students applying their learning from one setting to another.<sup>6,35</sup> In analysing and solving complex, authentic cases, it is believed that students are exposed to the dilemmas that they will face in their professional lives where they gain both theoretical and practical understanding of their disciplines and build on prior experience.<sup>36</sup>

The fact that some educators used CBL while others did not can also be attributed to factors beyond disciplinary knowledge such as time constraints, educator's teaching and learning philosophies, pedagogical styles, and perceptions and attitudes. As noted previously, for the purposes of this article, only CBL cases in pharmacology were further explored.

### **Strengths and limitations of CBL**

A closer look at the case studies in pharmacology (Table 3) revealed that knowledge featured in CBL in several forms, including background knowledge, researched knowledge, and later knowledge recontextualized for patient education. CBL also served to extend understanding beyond existing cases to include knowledge learnt about drugs, adverse effects, the best route for administration, and the impact on human health, indicating that Domain 1 may be addressed using a CBL approach. The use of CBL in small groups with discussion sessions was also believed to improve communication skills (Domain 2), confidence, research, being a team-player, and problem-solving skills. CBL develops problem-solving skills when the format allows for several possible solutions to be explored rather than focussing on a correct answer. CBL uses evidence to support proposed solutions and provides the opportunity for reflection on the strengths and weaknesses of the solution.<sup>16,34</sup> Cases therefore need to be designed to provide an accurate representation of the practical world, including its complexity and ambiguity in order to assist students to evolve.

With the growing emphasis on pharmacists being members of health care teams, there is a need for greater interaction between pharmacists and other healthcare professionals and patients.<sup>34,37,38</sup> Cases can include interaction with other health professionals throughout students' training in order to prepare them for an integrated model of collaborative clinical care when entering practice.<sup>22,24,25</sup>

While Domains 1 and 2 are emphasized within the current CBL approach in pharmacology, most of the graduate attributes identified by educators (Table 1), including empathy, are located within Domain 3. Dall'Alba<sup>39</sup> argues that current pedagogical practices in profession-driven programs in higher education do not adequately prepare graduates for professional practice in an evolving world. True professionals incorporate personal and social responsibility that is characterized by integrity, responsibility, and ethics.<sup>23</sup> The moral dimension is a characteristic feature of being a member of a caring profession, but this is not easy to teach or assess and therefore requires further exploration. Being a professional involves more than a combination of knowledge and skills and calls for professional socialization (comprising of attitudes, values, and judgement) in decision-making.<sup>23</sup>



Developing the third domain should go beyond the application of knowledge to include decision-making, judgement, and how reflection informs future decision-making and practice. It also involves dealing with real world ethical problems that are filled with conflict and emotional reactions, which students are not exposed to in the current CBL approach. Pharmacy educators should therefore consider including more reflection on the emotional component in CBL in order to develop reflective practitioners.

### **Revisiting the domains - a need for greater emphasis on developing Domain 3**

According to Barnett et al's <sup>17</sup> schema, interaction amongst the three domains within professional curricula is represented by three interconnected circles (the largest is possessing and displaying, followed by almost equal proportions of knowledge and self). This article argues that in a professional stream such as the health sciences, while knowledge is a major contributing factor, it is possibly inflated in terms of historical dependence on theoretical knowledge. Changing times perhaps call for a graduate to possess almost equal sized circles of Domains 1 and 2 with the largest circle being the attributes in Domain 3 that relate to the 'self.' It is argued that activation of Domain 3 is not designed to adhere to another set of preferred actions, roles, and identities; rather, professional attributes embody a relational, responsive set of evolving choices drawing on all three domains.

This article also argues that although CBL appears to currently develop the first two domains of Barnett et al's <sup>17</sup> schema, there are possibilities for greater engagement to develop Domain 3. These include implementing different forms of CBL that can provide more detailed patient information in order to foster a more personal touch. Numerous studies across disciplinary fields have argued that the development and assessment of graduate attributes should be more explicit within curricula rather than assuming that students will develop them on their own. There is a need to foster student awareness of graduate attributes and to place them in the context of their future careers, using reflective journals to gather evidence. Reflective journals, portfolios<sup>40</sup> in teaching and assessment, video recordings with reflection, and exposure to real patients can assist in developing Domain 3 in CBL. Other options pertain to the type and nature of the cases used. Incorporating cases with more complexity and involving more virtual<sup>41</sup> and real human interactions can also assist in developing graduate attributes such as ethics, empathy, and professionalism. In cases where judgement and ethics are required, there is no single correct answer, but rather room for debate, choices, justification, and reflection. Research in the area of professional education,<sup>26</sup> and authentic and cumulative learning, could offer further insight into developing Domain 3. It can be argued that professionalism is not something that can be learnt from a theoretical perspective and that more exposure to practice, role models,<sup>29</sup> and experience in the early years of pharmacy studies can play a role in developing Domain 3.

Curricula should incorporate the three domains of knowledge, action, and self. The challenge, however, is that these need to be developed and to some extent integrated in the curriculum. Certain graduate attributes are being developed within the various majors or modules offering CBL, but these appear to occur in isolation, calling for greater integration across modules and years of study within the BPharm curriculum.

### **Limitations**

This study did not analyze all majors/modules using CBL. CBL in modules such as pharmaceutical practice might reflect greater activation of Domain 3. There is, however,

currently very little integration between the modules and the attributes that should be developed. This is an area for further investigation as well as the possibility of making graduate attributes more explicit in the curriculum. This study did not incorporate the perspectives of students, recent graduates, practicing pharmacists, or other healthcare professionals. Their inclusion could enrich future studies, enabling triangulation of insights into learning experiences, active strategies, and pedagogies such as CBL and interprofessional education. Feedback from graduates and employers could also assist in the formulation of approaches to develop work-readiness through knowledge, skills and professional development.

## **Summary**

The study revealed that CBL in its current form appears to strengthen Domains 1 and 2 but may be limited in addressing Domain 3, as the cases used seem to be an extension of theoretical knowledge and application. As the world becomes more complex and uncertain, knowledge and skills are no longer sufficient. Educators are also confronted with numerous questions regarding the type of professional they are developing and how students' curricular experiences shape them professionally. The concept of graduate attributes is generally not well-known, and more explicit links perhaps need to be drawn between such attributes, pedagogy, and professional learning. A shift from epistemological and practical knowledge and application to developing professional ways of being may be required within higher education. This article suggests that CBL should not be regarded as a single strategy, but instead integrated as part of a dynamic interaction with other active learning strategies to develop Domain 3. Suggestions include integrating interprofessional education with CBL and including a greater patient component (virtual, real, or both) to develop more empathetic, reflective, and life-long professionals for the ever-changing workplace. How these attributes are selected and whether they are developed within individual modules or across modules and years of study require further thought and investigation.

## **Author contributions**

V. Singh was responsible for the conceptualization, literature review, data collection, analysis and writing of the article. She was also responsible for the first draft of the paper, editing, revising and writing the final version. M. Samuel contributed to conceptualizing the paper, writing and reviewing the paper, crystalizing the research questions, critiquing and writing the final version. J. Wassermann was involved in the conceptualization of the article and providing initial feedback.

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## **Declaration of competing interest**

None.

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